CRANFIELD UNIVERSITY

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# MATURITY FRAMEWORK FOR E-GOVERNMENT IN OMAN

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# ABSTRACT

The aim of this research was to develop a model for successfully managing the development of e-government in Oman. E-government refers to the transaction of government business with citizens by electronic means, including email and the internet.

The outcome of a series of workshops for managers involved in IT in Oman was that a number of issues would need to be investigated before starting to implement e-government on a large scale, and there was seen to be a need to develop a systematic roadmap.

The management of the Y2K project in Oman was then evaluated, and practical lessons were learned which would be applicable to subsequent national-scale IT projects.

Ways of measuring the progress of countries regarding e-government, and a number of basic management models for introducing e-government, were found by researching the literature. These models covered fewer management aspects than had been found in this research. One important model was the Maturity Framework, which had been applied with some success for managing IT in one international company and one UK Government agency.

It was decided to develop a maturity framework for e-government, incorporating the best ideas from the literature, and adding new ideas from the research carried out so far. Detail was added to the new framework, called the POTIRDMO framework, by research involving a large number of IT stakeholders in Oman.

The completed POTIRDMO framework has been tested in use and has been compared against frameworks developed by other Governments. The new framework is more comprehensive than previous frameworks because it includes People and Organisational aspects of management, in addition to Technology aspects. It also defines the Characteristics of each stage, the Tasks to be done, and the Measures of completion. Road mapping and benchmarking functions are implicit within the model.

It is now being used to manage the development of e-government in Oman.

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# CHAPTER 1

# INTRODUCTION AND METHODOLOGICAL FOUNDATION

In this thesis the development of a model for managing the introduction of e-government is reported. The model is substantially more comprehensive than previously reported models, all of which deal with only a limited aspect of the whole problem.

## 1.1 INTRODUCTION

Information and Communication Technology (ICT) is becoming one of the core foundations underpinning economics and sustainable social and economic development. All over the world Governments are under pressure to develop ICT strategies to narrow the digital divide between the connected and unconnected of their people. The Arab world, including the Sultanate of Oman, is faced with challenges in this regard to develop ICT effectively. When the environment, readiness and usage layers of ICT are considered, there are considerable gaps in the Arab world (Dutta, El-Hage, Sabbach & Tarazi 2002:186).

Furthermore, the potential of ICT in the delivery of electronic services in both the public and private sectors has by now been universally recognised. In fact ICT has the potential to redefine the fundamental mechanisms and operations of these institutions and to change them dramatically (Anon 1 2003:1).

## 1.2 STATEMENT OF THE PROBLEM

The development of Oman's national infrastructure began in 1970, under the leadership of Sultan Qaboos, the ruler of Oman. The Government's main concern at that time was to build a basic infrastructure for the country and to set up Government Ministries to manage the public areas of Finance, Education, Health, etc. The use of

information technology (IT) was not even considered at that time, but from 1980 the use of IT started to spread widely among Government Ministries and other Government organisations.

The implementation of IT in these Ministries was through individual efforts. Some Ministries had their own internal local knowledge and others employed specialist consultants. In the absence of an overall national IT strategy, individual Ministries defined their own standards and policies. This of course created a duplication of effort and created problems in respect of information sharing. One can envisage the problems that would arise through not having a national IT policy. Should, for example, the Government introduce income tax, the possible duplication of databases of Government employees, could be a very difficult and potentially aggravating situation.

Recently the use of IT has increased in the Government, in the private sector and with private individuals. For example, internet subscriber[1] numbers have risen from zero to about 50,000 from 1996 to 2003, indicating a significant growth in IT knowledge and usage.

National IT policy became an issue of concern in Oman, and in 1990 the Government Information Technology Committee (GITC) was formed, based on the initiative of individual IT managers, with its aim being to develop and implement a common policy for IT. Unfortunately, this Committee failed and was disbanded in 1992. It was commonly held that the reason was lack of Government support at that time. More recently, the Government has realised the importance of IT in Oman and the need for an organisation such as the GITC. In 1999 the Government established the Y2K (Year 2000) Task Force to deal with that one-off crisis, and in the year 2002, the Information Technology Task Force (ITTF) was established to assist the development of e-government strategy in Oman. Furthermore, in 2003 the Government established the

[1] Source: Oman Telecommunication Company (OMANTEL)

Information Technology Executive Committee (ITEC) to oversee the implementation of e-government strategy.

The concept of e-government[2] is new, and most countries are at an early stage with it. There is no unique model found appropriate to be adopted. Where it is being implemented, most e-government initiatives mainly concentrate on the development simply of technology solutions, ignoring the management and human aspects which will be seen in this thesis to be critical.

It will be seen that managing the development of IT systems has given rise to considerable failures and difficulties, and that there is a gap in knowledge about how to do this successfully. The concept of a management tool called a Maturity Framework was originally developed for software engineering purposes. It is the premise of this research that the ideas of the Maturity Framework can also be very usefully adopted for other management functions, in particular managing the development of e-government. No evidence could be found that a similar Maturity Framework for e-government has been undertaken previously in Oman or anywhere else.

In this chapter, the way in which this problem was researched will be explained. Then attention will be given to the rationale, the aims, and the approach to the research, and to the research process, the research design and the conceptual and geographical limitations. The way in which the results of the research will be presented in this thesis will be explained.

The development of the scope of the research will be highlighted first.

[2] e-government refer to all the actions a government takes for administration and management by using ICT tools, also often written as e-government or e-governance.

## 1.3 DEVELOPMENT OF THE SCOPE OF THE RESEARCH

The work started in 1996, on a part-time basis. Initially it concerned the merging of Computer and Telecommunications Departments into Information and Communication Technology (ICT) Departments, for Oman Government Organisations. That research was based on case studies and interview studies.

Ten aspects of management which are important in managing the merger process were identified as a result of this work. Three ministries have already applied these aspects as guidelines prior to their mergers of Computer and Telecommunication departments.

### 1.3.1 A new direction

In 1998 the researcher organised a workshop, in which IT managers from a number of Ministries met to discuss the development of IT in Oman. The ten aspects of merger were presented. While this work was felt to be very useful for the specific problem of merging departments, discussion revealed that Ministries also faced wider problems. One was how to achieve the implementation of the delivery of electronic Government information by electronic means. Another was how ministries that had developed incompatible systems could share information.

As result of this workshop, the following issues of concern were identified. These issues were later confirmed by a meeting of some senior Government officials on 24$^{th}$ October 1998.

- As a result of the imminent Y2K problem and copyright and data protection issues that had come to light, the Government had realised that there was a lack of co-ordination between Government organisations in the area of information technology.

- The failure of two previous major projects, the Government Information Technology Committee (GITC) and the Geographical Information Service (GIS), indicated that the problem of co-ordination is a difficult one.

- There was felt to be an urgent need to establish an authoritative national body for IT, which could assist in formalising and co-ordinate information technology (IT) strategy for the Government of Oman.

- The creation of this advisory body would be a step forward, but it would not solve the actual implementation of e-government services throughout the Ministries and the public sector in future. Therefore, there was a need later to define a "road map", which the Government could follow for the implementation of electronic delivery of services after the creation of such a body.

A proposal for the establishment of an E-government body was submitted to the Government on 30th January 1999. This proposal was approved with minor modifications and it was agreed that the proposed body be officially established from 1st January 2000. As a more urgent step "The National Y2K Task Force" was established on 22nd February 1999.

Thus the research was conducted against a background of rapidly unfolding events. These developments pointed to an expansion of the scope of the research. The rationale for this expanded scope will be explained next.

### 1.3.2 Rationale

The main reason for research on e-government is to be found in a request to the researcher from the Oman Government to investigate the possibilities of e-government in Oman. As a result of the success of the earlier merger study, there was support for the application of a research approach as a way of ensuring the most reliable and valid results. The more usual approach in Oman would have been to commission a consultant's report. The research approach was intended to ensure valid and reliable data capture and analysis at the highest academic level possible. The personal interest and professional engagement of the researcher also contributed to the reasons for conducting the research.

### 1.3.3 Aims

The aims of research in the social sciences are clearly related to realising objectives, and to understanding the realities of which we are part – in a scientifically valid and reliable way. To achieve this, the research process entails *inter alia* the formulation of research goals (Du Plooy 2002:48).

For the purposes of this research, one aim was related to describing the existing state of affairs regarding e-government – or lack of it – in the Sultanate of Oman. Another aim was to show that a generic model might be developed to facilitate e-government. A further aim was to develop such a model for managing the introduction of e-government in Oman. Based on these starting points, the aims of the research can be formulated as follows:

1. To discuss the efforts of the Governments in Oman to merge IT and Telecommunication departments.

2. To describe the status of IT in Oman prior to any e-government initiatives in Oman.

3. To evaluate the problems encountered by the Sultanate of Oman during the Y2K experience, to indicate the scope of national abilities at the time.

4. To review the implications of e-Governance and maturity frameworks, as they are related to IT management.

5. To capitalise on the preceding work by developing a generic Maturity Framework for e-government.

### 1.3.4 Defining e-government

It is worthwhile at this point to consider the meaning of the term e-government.

The term e-government refers to the provision of enhanced access to government information, delivery of government information, and participation in democratic processes by means of secure, electronic technology designed to protect privacy (Davis, Hickox & Helliger 2001:2-1). West (2001) refers to e-government "as the delivery of government information and services online through the internet or other digital means". Deloitte's research (2000), defines e-government as "the use of technology to enhance the access to and delivery of government service to benefit citizens, business and employees", while IBM (2000) defines e-government as "the technology-enabled transformation of government services based around need rather than administrative convenience and around transformation rather than automation"

Since there is no single definition of e-government, the researcher intends to use his own definition of e-government as "Carrying out Government's information, administration and management activities using Information and Communications Technology". It refers both to transactions internal to government organisations, and between government and the citizen".

### 1.3.5 Boundaries of the research

The time span for this research was from January 1996 to December 2003. This period included the merging of IT-department and telecommunication departments in Oman, and the occurrence of the Y2K phenomenon. The research was limited to the geographical area of the Sultanate of Oman. The organisations studied were government ministries as they were structured during the time of the research - that is between 1997 and 2003.

## 1.4 THE RESEARCH PLAN

The following research plan was developed. The research consisted of three phases: Phase I (the initial phase), Phase II (the development phase) and Phase III (the proposed model). A summary of the research plan is shown in the Table 1.1, below.

**Table 1.1** The research plan

| Phases | Studies Conducted | Outcomes | Chapters |
|---|---|---|---|
| **Phase I (Initial phase)** | 1. Literature Review<br>2. Research Methodology<br>3. Merging of Computer and Telecommunication Departments | 1. Confirm the need for the research<br>2. Confirm the initial research topic<br>3. Address different research techniques<br>4. Ten aspects of managing the merger | One, Two |
| **Phase II (Development phase)** | 4. Study of IT prior to e-government initiatives<br>5. Post Y2K review | 5. Appraisal of past and current situation of IT in Oman.<br>6. Recommendation to set up national IT body<br>7. Key lessons learned from Y2K | Three and Four |
| **Phase III (The Proposed Model)** | 6. Study of existing e-government models<br>7. Development of the Maturity Framework for e-government | 8. E-government Maturity Framework | Five, Six |
| **Discussion and Conclusions** | 8. Comparison of the new model with previous models | 9. Validation of the thesis contribution | Seven |

## 1.5 BACKGROUND EVENTS

The research plan outlined above needs to be understood against the background of the researcher's employment activities and external events that occurred relevant to the research. These are indicated in the workflow diagram below:

**Table 1.2** Events taking place concurrently with the research

| Researcher's Employment Responsibilities | Research activities | Relevant external events |
|---|---|---|
| | | 1991. Failure of Government Information Technology Committee (GITC) |
| Managing IT Department for a Ministry | Setting the initial research concept – merging departments | |
| | Conducting case studies and empirical study of merging | Merger activities started in some ministries |
| Managing merged ICT department of the Ministry | Study of historical IT projects | |
| Also managing Y2K project of the ministry | Post Y2K review study | Y2K Project initiated in Oman |
| | Emergence of the research concept – Maturity Framework model for e-government | Various e-government initiatives started world wide |

| | | |
|---|---|---|
| Also Member of Advisory Board for National Citizen Registration System in Oman | Study of other applied Maturity model e-government models | Gartner consultants appointed for setting up e-government strategy in Oman. |
| Also Member of IT Executive Committee (ITEC) for overseeing the implementation of e-government strategy | Development of the Maturity Framework for e-government | Implementation of e-government strategy started |
| Also Chairman for setting up National e-government network infrastructure | Writing thesis | Implementation of National Citizen Registration System in Oman started |

## 1.6 OVERVIEW OF RESEARCH METHODOLOGY

### 1.6.1 Literature Research

The aim of the literature research was to find out what has already been researched regarding this field of study. The search was carried out at Cranfield University in the UK, and at Sultan Qaboos Universities in Oman using on-line databases such as BIDS, INSPEC, INFOTRAC, PROQUEST, BEST. Other publications were sought through the world-wide web (WWW).

The following journals were found to include papers on Information Technology (IT), and these were checked regularly.

- MIS Quarterly
- Government Information Quarterly
- Journal of Government Information
- ICA information
- Journal of Information Processing
- Cranfield working papers
- An International Journal on Information Technology in Government
- Sloan Management Review
- Harvard Business Review
- Information Systems Research
- Long Range Planning
- IEEE Technology and Society

As explained above, the research topic developed during the research and so literature searches had to be made on different topics at different times. Topics included IT management, e-government, maturity frameworks and the Y2K problem. The findings of the literature searches are reported in the different chapters as appropriate.

In general, very little academic literature was found of direct relevance to this research, and most references are government reports, consultants' reports, and articles based on experience and opinion rather than formal research.

#### *1.1.6.1 Reference techniques*

In this thesis the abbreviated Harvard reference technique has been applied to acknowledge the work of consulted authors. References are given whenever definitions are provided, statements are made, authors are mentioned or when direct quotations are given. As is appropriate for this topic, considerable numbers of references are published on the web. A problem with web documents is that they are not necessarily permanent, so the latest date of access by the researcher is given when referencing web pages.

Reference lists are appended to each chapter, and other sources found to be relevant but not specifically referenced, are listed in bibliographies after the reference lists.

### 1.6.2 Quantitative Methods

The underlying the principles of empirical research were studied in order to consider the appropriate research methodologies, and these are now described.

Scientific or quantitative methods are commonly used to test models or hypotheses. They rely on gathering quantitative data, usually by means of questionnaires and subsequent analysis of the data using statistical techniques. The questionnaire usually applies scales or graded responses to each question. Typically, the well-known five-point Likert scales are used with five step options from *total disagreement* to *agreement* with a given statement (Dixon *et al.* 1987:79-80; Sharma *et al.* 1983:149, 156; Du Plooy, 2002:128). These research techniques were not employed during this research, because at the time of the research there were only a few people informed about IT, telecommunications, merging of the same, and e-government. Furthermore,

these techniques are not appropriate for exploratory research, as responses are closed and limited.

### 1.6.3 Qualitative Methods

Mouton (1988:7) defined qualitative research approach as "antipositivistic, generating contextually valid descriptions and interpretations of human actions based on in-depth, insider constructions of the life world of the participants/respondents". He added that "the methodological implications are that the respondents themselves are making the statements to be analysed, rather than stressing measurements that are compared with universally accepted norms". Casell and Symon (1994:7) pointed out that there are a number of defined characteristics for qualitative research including "a focus on interpretation rather than quantification; an emphasis on subjectivity rather than objectivity; flexibility in the process of conducting research; an orientation towards process rather than outcome; a concern with context - regarding behaviour and situation as inextricably linked in forming experience; and explicit recognition of the impact of the research process on the research situation".

Howard (1985) suggests that, there are different kinds of qualitative research; these include biographies and participant observation. For the purposes of this research, participant observation was chosen. The different techniques for participant observation include full participation, the participant as observer, and the observer as participant. The role of observer as participant was chosen for this research, because it limited the interaction and contact between the respondents and the researcher, holding back the risk of identifying with the respondents and thus biasing the findings.

### 1.6.4 Selected empirical research approach

Considerable use was made of qualitative methods during the course of this research. There are a number of reasons for selecting the qualitative approach. It utilises the researcher's practical experience in his role in e-government initiatives, to understand people and make sense of their experiences during face-to-face interviews. It is also

contextual – focusing on a current phenomenon involves detailed and intensive work. The main research tool is the researcher personally, who endeavors to obtain the participant perspective (Mouton 1988:11). It is one-man research (Hubermann & Miles (1985:359-360) and it allows an active role for the researcher and the respondents.

In addition, qualitative research with its interpretative approach allows the researcher to gain insight into participants' ideas and thought and enables access to the participants' values and practice by the asking of probing questions. Moreover the qualitative approach takes into consideration the human dimension, which is essential for a traditional cultural society in a country like Oman. People in this culture generally are reluctant to participate in surveys, simply because they fear being misinterpreted about what they convey and that their statements could be used against their individual interests.

### 1.6.5 Data collection method

To capture the empirical data, qualitative measuring instruments were developed in the form of semi-structured interviews. This approach was selected because empirical research is aimed at the insights of the respondents and is therefore guided by inductive reasoning. The reality as perceived by the respondents had to be described in terms of the meanings the respondents attach to the elements of the field of study they were questioned about. The data needed the multiple sources of their knowledge, including insight into their values, experiences, cultures and the ways they interpret and understand these. Because of the exploratory nature of the research and because best practices and insights played a defining role in the re-engineering the existing models, the answers received were analysed thematically (Du Plooy 2002:34).

### 1.6.6 Content analysis

Preece (1994:86) pointed out that for content analysis "procedures have been developed which attempt to be more objective and to involve a large group of people

in defining categories for analysis". Adams & Schavaneveldt (1985:305) described content analysis as "a research tool for the scientific study of speeches, records, and other written communications to determine key ideas, themes, words, or other messages contained in the record". Jawad (1995) studied the acquisition of IT systems in Oman. He applied content analysis in his research: he listened to interview tapes and devised categories where statements and opinions were grouped together to form factors. He repeated the process until no new factors emerged. Jawad (1995) cited (Easterby-Smith, Thorpe & Lowe, 1991; Krippendorff, 1980; Gale & Grant, 1990). This research adopted a similar approach. Interviews were recorded and statements and opinion were grouped together to from categories of "Aspects" in Chapter 2. In Chapter 6 a similar process was also followed, to form three types of factors (Characteristic, Task and Measures).

### 1.6.7 Reliability Tests of content analyses

The process of reliability testing applied in this research was to select a number of tapes randomly and ask another expert (the second rater) to apply the same content analysis techniques to derive categories independently. Then both the researcher's results and the rater's were compared. Jawad (1995) cited this procedure from Gale and Grant (1990). Jawad (1995) also consulted expert opinion as another reliability test. The researcher found this procedure very effective in his own research.

### 1.6.8 Selecting Participants

Gorman and Clayton (1990:127) state that in "undertaking research in organisational settings, there is good reason to interview a full range of staff stratified within the organization in order to ensure a representative range of views is heard". Creswell (1998) suggests that the researcher should select individuals who make positive contributions, display leadership qualities and reveal independent thinking. Creswell (1998:124) also notes, "For one-to-one interviewing, the researcher needs individuals who are not hesitant to speak and share ideas, and needs to determine a setting in

which this is possible. The less articulate, shy interviewee may present the researcher with a challenge and less than adequate data". In this research individuals were selected on the basis of their willingness, professional capabilities, contribution to the national projects and academic capabilities.

More details of the methods applied are given at the appropriate places in the thesis.

## 1.7 LAYOUT OF THE THESIS

To achieve a logical sequence to present the research results, the following layout was selected as the most logical: Chapter 1 introduces the problem and describes the methodological foundations of the research. Chapter 2 contains research focusing on the merging of IT and telecommunications departments. Chapter 3 sets out the background in more detail: the status of IT in Oman prior to e-government initiatives. In Chapter 4 the impact of the Y2K phenomenon is discussed. Chapter 5 analyses the implications of e-government, and Maturity Framework models as they are related to IT management. Chapter 6 builds on the preceding chapters and develops the Maturity Framework for e-government, which is called the POTIRDMO Model. Chapter 7 summarises the findings and presents conclusions and recommendations.

## 1.8 SUMMARY

In this chapter, the research problem was introduced and the methodological foundations were explained. Attention was given to the aims, rationale, research process and conceptual clarity regarding e-government. Chapter 2 reports the research on the merging of IT and telecommunications departments.

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# CHAPTER 2

# THE MERGING OF COMPUTER AND TELECOMMUNICATIONS DEPARTMENTS IN GOVERNMENT ORGANISATIONS IN OMAN

## 2.1 INTRODUCTION

The merging of computer and telecommunications services in organisations has been driven by the increasing convergence of computer and telecommunications technologies and by the emergence of regional and global networks which can be used for both voice and data.

At the time of this part of the research, some organisations had already merged their computer and telecommunication departments into single departments called "Information and Communication Technology" (ICT), and others were likely to do so. Although these mergers were often seen as steps toward achieving cost savings and staff reductions, unexpected problems usually arose as a result of the mergers, and savings were not in practice achieved very quickly.

The research in this chapter has identified the important aspects to take account of when considering a merger, and provides recommendations for organisations wishing to carry out a merger, or for managing a merger that they have already started.

Information has been gathered by literature review, by conducting three small exploratory case studies and a larger single case study, and by interviewing a varied selection of people who have had experience of a large number of mergers. This study has been based on government organisations in Oman.

### 2.1.1 The problem

The researcher is an IT manager and carried out a merger of his own organisation's computer and telecommunications departments intended to benefit from converging of the technologies and to achieve cost savings. Immediate dissatisfaction appeared once the merger went into practice, from senior management of the organisation, from the IT staff and from the users of the IT services.

Some mergers that had taken place in other organisations were then examined, and it was found that similar experiences were reported. It was therefore thought that it would be worthwhile to conduct research to identify the important aspects arising in a merger, with the intention of being able to provide advice on managing mergers in the future.

## 2.2 REVIEW OF PREVIOUS PUBLICATIONS ON MERGERS

During the publication review it became evident that the effect of a merger is to cause widespread change to happen in the organisation. It was therefore decided to widen the literature review to cover some aspects of organisational change issues. Since this research was conducted in Oman, it was decided also to cover certain Middle East specific issues.

The review was structured to cover the following topics;

- Merger of Computer and Telecommunication Departments
- Middle East specific issues
- Organisation change and change management issues
- Management issues in IT departments.

### 2.2.1 Merging of Computer and Telecommunications Departments

Although computer and telecommunications departments have been merged in many organisations, no publications were found dealing directly with this type of merger. What was found was mostly government and consultants' reports and reports made available by private companies. A top-up literature search in 2003 revealed no directly relevant publications either. However, some publications were found of indirect relevance in a number of areas. The most important of these reported experiences with merging library and computer services in universities (Lovecy 1994; Foster 1995; Feng & Weise 1988; Gavin 1995; Lester 1994; Saunders 1993).

Improving customer service and user support were reported to be important issues for library and computing mergers (Woodsworth, 1988). Foster (1995) points out that the decision to merge depends on circumstances such as culture, politics, history, geography, managerial structure and, most important of all, personalities.

Bruckman (2001) suggests that there is no perfect way to accomplish the merger process. He argues that the process of integration of two entities requires the evaluation of organisational structures, culture, staffing levels, leadership selection and facilities.

In the 1990s, experts began to use the term ICT in social and organisational contexts, to replace the separate terms IT and Communications. There was concern with a range of issues in the context in which ICT was used. For example, ICT is defined as "...the set of activities which facilitate by electronic means the processing, transmission and display of information" (Rodrigues & Wilson, 2000). Escap (2001) defines ICT as "... technologies people use to share, distribute, gather information and to communicate, through computer networks". Marcelle (2000) states the definition of ICT as: "ICTs are a complex and varied set of goods, applications and services used for producing, distributing, transforming information – (including) telecoms, TV and radio broadcasting, hardware and software services and electronic media".

Other authors such as Catchpole (1995) and Pearson (1995) were concerned with the relevant technological developments, such as the emergence of Computer and Telephone Interconnection (CTI). These peripheral publications were very useful in providing background technical information pertinent to undertaking a merger.

### 2.2.2 Middle East Specific Issues

This section will investigate features (such as education, culture and management style) that give rise to issues that are specific to the Middle East, which could have an effect on any attempt to implement the merger of computer and telecommunication departments in a government organisation.

*Education*

"The education system in the Middle East, especially in the Gulf States, tends to be heavily biased towards learning by rote rather than on a creative or problem solving approach" (Rawahy[1], 1994). This means that students enter the workplace ill equipped to cope with the rigors of using new technology in a creative way. This makes it very difficult to find staff that are capable of becoming good computer programmers, as this requires the ability to grasp concepts, rather than the ability to recite facts. It also makes it very difficult to train computer users in how to become competent and self-sufficient. In addition, existing staff, especially older ones, were educated at a time when education facilities and literacy levels were much lower.

"The situation is made worse by the fact that there is a 'brain drain' affecting most Middle East countries. People are leaving for the West in search of a better standard of living and appreciation of the work that they do" (Rawahy, 1994).

[1] This author is no relation to the author of this thesis.

*Culture*

A number of cultural issues were identified by Rawahy (1994) that are prevalent in the Middle East and that will have an impact in the implementation of a merger:

- There is a general lack of awareness of the importance of using time effectively. This includes a lack of forward planning and monitoring of progress as well as the unnecessary wasting of other peoples' time (both colleagues and customers).

- Nepotism (being biased towards relatives and friends) is common in the Middle East. This leads to recruitment and promotions being carried out on the basis of who you are, rather than on ability. This can lead to inappropriate staff being recruited, inappropriate promotions, and loss of morale amongst more able staff who are passed over.

*Management Style*

Rawahy (1994) also identifies a number of relevant management issues which are prevalent in the Middle East:

- Some managers consider their departments as part of their own property or territory, that they must guard against being taken over by another. They tend to forget that they must cooperate as part of a team for the good of the organisation. This can include the sabotaging of useful programmes that are initiated by colleagues so as to make them seem useless.

- There is a tendency to be interested in expensive prestige projects for the sake of impressing rather than for the benefit of the organisation.

- Most managers concentrate on particular areas of strength and neglect weaknesses. This includes concentrating on new technologies and modernising equipment without paying any attention to the personnel requirements, improvements in administration procedures or incentives.

- Some of the older managers, and some newer ones, are academically less educated than newer staff. They tend to exert excessive control over the decision making process and like to manage their staff by fear.

### 2.2.3 Organisational Change

Martin (2001) points out that merger activity is a creator of change within an organisation. Mullins (2002) considers that takeovers or mergers are drivers of change in the organisation. Mullins (2002) also suggests that implementing ICT in an organisation involves organisation change issues such as strategy, business process and organisational structure. Falk (2001) found that the introduction of ICT and training were important drivers for change in the organisation.

Stoner and Freeman (1992) identify three aspects of organisational change that are frequently referred to. These are structure, technology and people. They define changing structure as rearranging an organisation's internal system, such as the lines of communication, work flow or management hierarchy. Changing an organisation's technology involves altering its equipment, engineering processes, research techniques and production methods. People changes are defined as attempts to improve the skill and knowledge of the organisation's members. Mullins (2002) suggests that technology forces not just change in the way work is performed, but also changes the structure and the physical layout of the organisation. Hooper & Potter (2000) considered that employees may fear losing jobs or status when change is applied to their organisation.

***Bureaucracy and change***

Government ministries, in the author's experience, mostly have a bureaucratic organisational structure. This is characterised by a high degree of job specialisation, by clear and significant status differentials, and by an emphasis on control. This form is suitable for an organisation dealing with a stable and simple environment. However, in an environment which is changing rapidly, rules, regulations and working

procedures can quickly become out of date and irrelevant. Moreover, rules and regulations can become barriers behind which individual managers hide or which they use to justify incorrect decisions.

Bureaucracies are now viewed as restricting an organisation's ability to respond to change (Turner, 1993). Carnall (1990), states that inflexible systems can create demotivating conditions for employees and can reduce the ability of managers or employees to innovate.

Rawahy (1994), states "The tendency in the Middle East is that this bureaucratic structure supports the general culture in which decisions are passed ever upwards to the very top, and that the senior managers spend most of their time on mundane paper-work. This has the effect of slowing down the whole decision-making process". Also junior staff are not encouraged to question upwards, but to just do what they are told. Thus if a decision is made that is incorrect, for whatever reason, it will tend to be implemented, as no one will question its validity, even if they know it to be wrong. Senior managers will also not change decisions for fear of losing face. To overcome some of these problems there is a great tendency to form a committee for almost everything. This again has the effect of slowing the decision-making process to a very slow pace. These traits are reflected in the low individualism and large "power distance ranking" of Middle East countries (Turner, 1993).

### 2.2.4 Current management issues affecting IT departments

IT departments have different images from one organisation to another. Some organisations consider IT as part of the core business and a driver for success; others consider that IT incurs costs rather than delivers benefit.

Tuner (1993) found that relationships are often poor between members of IT functions and business managers. The former believe that IT does not get the recognition it deserves, and the latter have little understanding, regard for, confidence, or trust in the

IT function. The most challenging issues were about the styles and behaviour of many of the people in IT, rather than the technology or systems.

Varhol (1996) pointed out that end-user support should be considered to be a high-priority task for IT departments. She adds that, most users consider the support provided by their IT departments as untimely, unhelpful, and as frustrating as their original problem. Conversely, most IT professionals consider the user support function as a time consuming and thankless task. The main problem, however, is that IT professionals and end-users rarely speak the same language.

Applegate and Zawaki (1997) suggest that to meet future challenges IT departments must change in the following areas;

- The way they relate to other business units in their organisations
- The way they deploy new technology
- The way IT professionals are organised, evaluated and acquire new skill sets.

This review of the literature has highlighted some important management aspects, such as organisational changes, Middle-East issues and the role of IT departments. These aspects were all found to be important when undertaking this research.

## 2.3 THE FIRST PHASE OF THE RESEARCH - MINI CASES STUDIES

Firstly three exploratory cases of mergers of computer and telecommunication departments were examined. The mergers had been carried out by three different government organisations.

Face-to-face discussion were conducted with at least five different players within each of these organisations; a representative of the higher management team, the IT

manager, head of computer operations, head of network services and a representative of the users of the IT services. The following interview agenda was prepared:

1 - What was the reason for the merger?

2 - Was there a study prior to the merger?

3 - Were immediate goals achieved?

4 - What was the result after the merger?

In addition, some documents were made available, such as organisation charts and reports, but due to the nature of these organisations it was not possible to have access to all documentary sources. In one case it was possible for the researcher to make direct observation of users and equipment; in the other two cases it was not possible, and the interviews with managers were the only source.

### Case 1

The merged Computer and Telecommunications department in this organisation was formed at the beginning of 1995. The act of merging consisted of appointing one person to be Director of the merged departments, with a single budget.

The Director of the IT Department stated that the merger was undertaken as a result of discussion only, with no formal study having been conducted. The structure of the merged department was formulated after the merger was announced. It then had to be changed several times, and at the time of the interviews was still in the process of being modified.

At the time of the interviews, various functions of the Telecommunications Department were still independent of the Computer Department. Senior management felt that, apart from some cosmetic co-operation brought about by having one Director, co-operation at the detailed planning and implementation level still did not exist after almost two years.

### Case 2

This organisation had to undergo considerable structural change because budgetary constraints forced it to reduce its number of departments. To achieve this it was decided to either merge or cancel several departments. Human Resources and Finance were merged into one department and computing and telecommunications were also merged.

No guidelines or new structures were given to the Head of the new Information Technology Department. After two years the required staff reductions and cost savings had not been achieved, and there was still a need to design and implement a suitable structure for the department.

### Case 3

This organisation also focused on the need to reduce costs, their goal being to reduce some functions within the department's organisational structure. After the merger of the computer and telecommunications departments, it was realised that this immediate goal had not been achieved, and this created some concern about whether the decision to merge had been a good one.

### 2.3.1 Findings from the mini-cases

Findings from the three cases are summarised in Table 2.1 it can be seen that they are very consistent, and that the results of the mergers were unsatisfactory.

**Table 2.1** Findings from mini-case studies

| Issues | Case 1 | Case 2 | Case 3 |
|---|---|---|---|
| **What was the reason for merging?** | | | |
| To achieve cost saving | Yes | Yes | Yes |
| To reduce the number of departments in the organization | Yes | Yes | Yes |
| To achieve multi-skilling | Yes | No | No |
| Technology driven | No | No | No |
| **Was there a study before the merger?** | No | No | No |
| **Were immediate goals achieved?** | | | |
| Cost saving | No | No | No |
| Staff reduction | No | No | No |
| **After the merger** | | | |
| Was the new department structure satisfactory? | No | No | No |
| Did other management problems arise? | Yes | Yes | Yes |

Senior management in each case sought to merge the departments in the expectation of cost and staff reductions. Most telecommunications systems were by now digital and therefore seemed to involved similar technology and skills to computing, so when cost pressures arose, it had appeared sensible to merge the two functions. New technology such as CTI equipment might be thought to force or tempt an organisation into merging functions, but this does not seem to have occurred.

In each case one of the managers in charge of the existing computing and the telecommunications departments was appointed to be the manager of the merged department, and the merger was at that point deemed to have taken place. Thus the merger of the two departments was imposed by a top down senior management decision. No study of the implications and requirements of a merger was carried out beforehand.

In each case a large number of unexpected problems presented themselves to the manager of the merged department. Problems occurred in finding an effective organisational structure for the new department, convincing staff that they now worked in a single department, and convincing higher management that some investment would be needed before arriving at cost savings. In one case the merger proceeded no further than the elimination of one departmental manager and the imposition of a double load of work onto the remaining one. In another case a lot of new administrative work was generated by the merger. In two of the cases it took about two years to arrive at the expected benefits.

It was concluded from these three cases that mergers are difficult, and that an in-depth study should be conducted, aimed at producing practical advice for managing mergers.

The in-depth study had two components: one of the cases was selected for investigation as a more extensive case study, and a series of interviews was carried out with participants in a wider range of cases.

## 2.4 THE EXTENDED CASE STUDY

The organisation studied has more than 5,000 employees and its main use of IT is storing and maintaining database records and supplying information to other organisations. It also uses IT to maintain records on its own employees. Before the merger there were 25 staff in Computing and 30 in Telecommunications.

### 2.4.1 The merger decision

In early 1995 the decision was taken by the senior management of the organisation to form a single department to be called the Information Technology Department. The following reasons were reported:

- There would be "less headache" for the management if all issues involving IT were handled by one department rather than two
- The hierarchical structure of the organisation would be simplified
- The merger would bring cost-savings in terms of equipment and staff reduction
- In other countries this merger has been done - why not us?

### 2.4.2. The new manager's situation

The manager of the existing computing department was appointed to head the merged IT department. The merger was then assumed to have taken place, and the benefits were expected to flow. Immediate problems appeared, according to the new Director of IT. He did not yet have a detailed knowledge of the communications side of his new department. He also found that he had inherited people with different attitudes, skills and education levels from those he was familiar with. These two things meant that he could not at once see how to:

- design a suitable structure for the new department and put it in place

- identify cost saving areas and quantify cost savings.

He believed that budget requirements, staffing issues, and training requirement for the merger should have been identified and approved by the management before the merger. This would have provided an early commitment to the implications of the merger from them and also from himself and his team.

Consultation with members of both departments had been very limited and steps had not been taken to properly inform people what was happening. This resulted in some members resisting the merger and not assisting in building their new department.

He also observed that different groups of the staff had different working cultures, and that there were prejudices between groups. He thought that it would take some time to resolve these. Also some administrative issues were generated temporarily as a result of the merger, which needed to be resolved.

Examples of administrative issues

- *The computer equipment inventory was well maintained, whereas the telecommunications equipment inventory was not.*
- *There were two help desks, one for the computer department and one for the telecommunications department, and these help desks needed to be unified.*
- *The budgets for both computing and telecommunications needed to be unified.*
- *The department's new logo had to be defined.*
- *Suppliers for both computer and telecommunications equipment had to be notified to deal with a merged department.*
- *All forms and files had to be unified.*

### 2.4.3 The structure of the combined Department

The new IT Director had to define a new structure based on his own experience and rapid consultation. After a few weeks he implemented his first attempt at a structure, but the structure then had to be changed more than three times in two years. This was because:

- Areas of overlap between sections were not detected in the beginning.
- Differing skill levels were found in different sections, People had to be relocated to the right jobs.
- The merger involved more than just putting the two departments under one control - the actual functions carried out needed to be amalgamated. It was not at first apparent which functions would best merge with which.

*Example*

*The LAN (local area network) was under a new Computer Network Section, and the WAN (wide area network) fell between the Network Section and Telecommunications Section. It was not obvious where general networking issues were to be dealt with.*

### 2.4.4 Training

Staff training was an unforeseen key issue in the new department. Before the merger could be effective, telecommunications engineers needed to learn how to maintain the computer equipment, and vice versa. This need was exacerbated because IT training was very expensive compared to other types of training within the organisation.

### 2.4.5 Staffing

Staffing issues were found to be among the major problems facing the IT Department. The Computer Department was largely staffed by technical staff whereas the Telecommunications Department was largely staffed by non-technical and non-skilled

staff, with the exception of their engineers. The IT management found it difficult to utilise the unskilled staff.

***Example***

*Twenty of the twenty five Computer department staff were technical (programmer, system engineer, technician) and only seven of the thirty Telecommunications department staff were technical (engineer and technician): the rest were only administrative.*

It took a lot of time to convince the staff that they were working under one department with a single management. There was a lack of positive contribution to building the new department.

Engineers from both departments were tasked with supporting both types of equipment. It was found that the computer engineers found it easier to cope with telecommunications equipment than vice versa. It was however found that with training and assistance the two groups did start to cope with their joint work.

***Example***

*Before the merger computer engineers always used to implement structured cabling for wiring the LAN network whereas the telecommunications engineers used non structured cabling for voice/telephone wiring. After the merger, data/voice cabling was implemented using standard structured cabling methods.*

*Successfully combining the cabling work was regarded as an achievement by the new ICT department.*

### 2.4.6 User Support

Users were the main customers of the IT Department. Therefore user satisfaction was the goal for the IT Department and its staff. The users were negatively affected by the

merger; they demanded to have higher quality of service, and a single point of contact for their needs, but they did not get them.

### 2.4.7 Comments arising from the extended case study

The merger was prompted by a wish to save money in the light of a worsening financial situation generally. It was then found that to implement the merger extra funds were needed for staff training and to modernise some equipment. Therefore the immediate financial problem was in fact made worse. There is however evidence that cost savings did appear after about two years.

The aims of providing quality operational services for the organisation and effective management of long-term aspects of new technologies through a single point of responsibility were eventually being achieved, but not as quickly as had been expected. It would have been helpful if the senior management of the organisation had realised the need to conduct initial preparation and consultation to arrive at a plan for the merger, and to be understanding of the IT manager's problems over the period in which the merger was being implemented.

## 2.5. INTRVIEWS TO IDENTIFY SPECIFIC ASPECTS OF CONCERN IN MERGERS

In addition to the extended case study, a survey was carried out to gather information from people involved in a larger number of IT projects in Oman. Twenty five people involved in mergers and others who were experienced in the management of IT were interviewed between May and June 1996 for an average of 30 minutes each.

### 2.5.1 Method – semi-structured interviews

The interviews were based on the semi-structured interview technique which was introduced in Chapter 1. The aim was a discussion with people actively involved in mergers, based on topics defined by an interview agenda common to all participants,

but allowing discussion of any other topics which participants felt were relevant. Open-ended questions were asked in an attempt to capture views and issues not included in the agenda. The interviews were conducted in Arabic and were all tape-recorded to facilitate content analysis. The translated interview agenda from Arabic to English is given in Appendix 2.1.

The method used to interpret the interviews was "content analysis", described as "a research tool for the scientific study of speeches, records, and other written communications to determine key ideas, themes, words, or other messages contained in the record" (Adams & Schavaneveldt, 1985).

Similar statements from the twenty five interviews were translated from Arabic and grouped under one heading to form different "Aspects" of merger. The headings of the aspects were composed by the researcher. For example, the following four quotes were grouped together to produce an aspect called "Quality of Service"

- *"The single point of contact has given the organisation and the users a better service".*
- *"After the merger we were able to contact the ICT department for different technological support".*
- *"The single help desk needed to be established, and staff needed to be trained to give the first line support".*
- *"I was very glad to be able to support the users from the single point of contact".*

More examples are provided in Appendix 2.2.

To check for the presence of personal bias in the data analysis, the researcher asked an academic (the second rater) from Sultan Qaboos University (SQU) in Oman to listen to some of the recorded interviews and to follow a similar analysis process to that adopted by the researcher. This procedure was adopted from Jawad (1995) who

had in turn adopted it from Gale and Grant (1990). Five tapes were selected randomly. The list of aspects found by the researcher was compared with the second rater's findings. The number of aspects identified by the researcher and the rater from the 5 tapes are shown in Table 2.2.

**Table 2.2** Number of Aspects found by the researcher and rater in five randomly selected tapes.

| Tape | Researcher Findings | Rater Findings | New Aspects |
|---|---|---|---|
| 1 | 7 | 6 | 0 |
| 2 | 8 | 6 | 0 |
| 3 | 9 | 9 | 0 |
| 4 | 9 | 9 | 0 |
| 5 | 6 | 5 | 0 |

It was noted from this exercise that there were no new aspects identified by the second rater from those five tapes. On other hand, the researcher found slightly more aspects in the tapes than the rater. This was thought to be because in conducting the interviews the researcher had spent more time on the issues, and also he listened to the tapes more than once.

In all, 10 aspects of concern in merging departments were found. Tapes 3 and 4 both identified 9 of them, and all the interviews identified quite a high proportion. This means that we can be reasonably confident that an ample number of interviews were conducted, and that all aspects had been identified.

As an additional check, the 10 identified aspects of merger were presented to two senior Information Technology (IT) consultants and two members of the Oman

Information Technology Committee (Oman ITEC) for their comments. No new aspects were identified by them. The Content Analysis applied in this research was therefore considered to have produced reliable results.

### 2.5.2 Findings from the interviews

Table 2.3 lists the ten aspects of merger that were derived empirically from the twenty five interviews. Each aspect has a description, which was composed by the researcher, taking into account the various statements which contributed to the aspect.

**Table 2.3** Ten aspects of managing merger of ICT departments, identified in the semi-structured interviews.

| No | Aspect | Description |
|---|---|---|
| 1 | Structure | The formal and informal structure of the merged department, identifying areas of overlap, and including how they can be amalgamated. |
| 2 | Operational Policies | Formal and informal tasks for daily work activities, policies to provide general guidelines and procedures to provide specific action requirements. |
| 3 | People | Staff training, staff motivation, skills and knowledge required for staff to perform their jobs effectively. |
| 4 | Quality of Services | Quality of services required from the merged department to support the end users from a single point of contact. |
| 5 | Technology | The required use of technology to perform jobs, tasks and the interfaces of both the computer and telecommunication equipments and between users and these technologies |
| 6 | Job Design | The role, responsibilities, and authority assigned to specific jobs within the merged department. |
| 7 | Human Resources Management | Administrative activities related to recruitment, selection, and development of the merged department. |
| 8 | Business Process | The way in which the process and events are handled during day to day operations within the merged department and with |

| | | |
|---|---|---|
| | | other departments in the organisation and in outside organisations. |
| 9 | Communication | The formal and informal patterns of communication and information flow within the merged department and the correspondence of these patterns to work force motivations. |
| 10 | Culture | The cultures of different working groups within the merged department and the basic values and beliefs of the organisation. |

### 2.5.3 Ordering the ten aspects of merging

The ranking of ten aspects of merger presented in Table 2.3 was not based on any research based ranking in order of importance, which would be outside the scope of this qualitative research. However the ordering of the aspects is intended to indicate a logical process for managing a merger, based on the researcher's practical experience, as follows.

The Structure of the new department determines the Operational Policies which in turn determine the People to be appointed, which determine the Quality of Service that is co-determined by the Technology, that are provided according to the Job Design which is determined by Human Resources, guiding the Business and Communications and Culture of the organisation.

## 2.6 DISCUSSION

Although no previous research has been conducted into this type of merger in Oman, and as far as we know in the world, the literature review led to the identification of four relevant areas to be considered, namely mergers in general, Middle East issues, organisational change and management issues in IT departments. Concerning organisational change, Stoner and Freeman's three components: structure, people and technology, were felt to be particularly valuable.

The three small case studies and the larger case study revealed that problems faced those organisations which undertook a merger.

The interviews study confirmed the extent of the problems and identified ten management aspects of a merger.

If these ten aspects are considered while the merging of computer and telecommunications departments is being planned, the merged ICT Department will not simply be seen as cost saving exercise, but also as a step toward improving performance in the organisation. For the merged ICT Department, a single brand with a single image will be created, with the ability to align with business partners in the organisation.

It is worthwhile mentioning that these aspects have been used in advising one organisation undertaking a merger, and were found to be practical and useful by the managers involved.

## 2.7 Proposal for how the findings could be applied.

It is proposed that mergers could be managed by conducting an impact assessment before implementing the merger. People involved should work to estimate how each of the ten aspects of merging may affect the various departments of the organisation, for example Finance, Maintenance, Human Resources. The goal is to identify key impact areas, and then to priortise them so that an action plan can be initiated and monitored.

Step 1: Based on the 10 aspects, designate whether the impact on a department is expected to be high (H), medium (M), or low (L).

Step 2: Prioritise the list of impacts by ranking each area as: 1 (High priority), 2 (Medium priority), 3 (low priority).

Step 3: Once relative importances are established then resources and time can be allocated. The highest attention is needed where there is *high impact* and *high priority.* Success is needed in these aspects or the merger effort will remain at risk.

Step 4: Once the high impact, high priority matters are dealt with, attention can be focused on the others in turn.

**Table 2.4** Proposed planning tool for mergers. This is filled in for each department in the organisation.

| Aspect | Impact H,M,L | Priority 1,2,3 | Action steps |
|---|---|---|---|
| 1.Structure | | | |
| 2.Operation Policies | | | |
| 3. People | | | |
| 4. Quality of Services | | | |
| 5. Technology | | | |
| 6. Job Design | | | |
| 7. Human Resources Management (HRM) | | | |
| 8. Business Process | | | |
| 9. Communication | | | |
| 10. Culture | | | |

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## Appendix 2.1 – Agenda used in the semi-structured interviews

*This agenda was used as a guide by the researcher so that all interviews would cover similar ground, and to check that all topics required were covered. It was not intended for use by the interviewees.*

**Interview Number**

**Name:**

**Place:**

**Date:**

**Interview Length:**

**Respondent's background**

**Job title:**

**Job function related to Managing ICT department:**

**Qualification:**

**Gender:**

**Experience:**

**Experience on which discussion is based**

1. Have you been involved in merger process? (Individual experience on mergers)

**Organisational Issues**

2. Were there any differences in working practice between the two departments?
3. There are any significant changes in organisation structure as result of merger?
4. Was the daily process affected as result of merger?

**Management Issues**

5. What was the driver for the merger? (Reason for merger)
6. What was the process undertaken to action the merger?
7. Was this the only merger that happened in your Organisation? (Past experience of the Organisation)
8. What was the expectation of services from the merged department? (Quality of service)
9. Are there any changes in administrative activities as result of the merger?

**Technological Issues**

10. Is there any interface between computer and telecommunication equipments?
11. Was there any effect of equipment happened as result of merger?
12. What is the process of achieving computer and telecommunication equipment changes as a result of the merger?
13. Are the budgets of computer and telecommunication separate or centralised?

**Human issues**

14. Are there any significant changes of human resource policies as result of the merger?

15. Any resistance?

16. What can be done to mitigate the effects of resistance as result of merger?

17. Are there any significant changes in the role and responsibilities of individual professional in the merged department?

18. Was the role of individual staff affected as result of merger?

19. Any other comments..?

## Appendix 2.2 - Examples of quotes from interview subjects

Reproduced here are statements from interviews which were assigned to three different aspects of the merger problem. The three aspects are randomly selected.

***"Technology"***

*Convergence of computing and telecommunications technologies and emergence of networks, and technologies such as CTI (Computer Telephony Interconnect) are issues that support the merger and need to be considered.*

*Technology changes and the ability to integrate the systems is the key element which supports the move for merging the computer and telecommunications departments.*

*Computer and telecommunications will be transformed, merging them into powerful knowledge and communication infrastructures.*

***"People"***

*Staff dissatisfaction may hinder the merger process. Staff should be briefed on the general objectives and structure of the new department, and consulted in the areas related to their work.*

*In the merged department the scope of daily work of installation, repair and maintenance is widened, so staff will require training in the work areas which are new to them.*

*A key consideration for the organisational change is the ability to acquire, maintain and apply appropriate skills, such as systems integration.*

*Nothing can spoil the merger faster than employees who do not trust each other.*

*The biggest problem faced by anyone attempting merger, as opposed to collaborations, is the frequent unwillingness of staff to accept new partners of working and new relation ship.*

***"Culture"***

*One of the things we could do when we merge, is to deal with culture issues.*

*As long as whoever takes over understands the culture differences and works towards resolving them, I do not see any problem.*

*The merged department must be seen as one cohesive group working together, but it was found that some different functions did not merge easily.*

# CHAPTER 3

# THE STATUS OF IT IN OMAN PRIOR TO E-GOVERNMENT INITIATIVES

## 3.1 INTRODUCTION

There are many exciting Information Technology opportunities for the Government of Oman. Ministries and other government organisations are still in a position to take advantage of the relatively recent introduction of Information Technology and to develop and adopt a coordinated approach. Unfortunately mistakes often occur when adopting these technologies. It is therefore important to capture lessons in the early stages and to use them to mitigate future problems on larger scale projects.

This chapter explores the position of IT in the Oman government ministries at the point just before it became important to embark on national scale projects. A short history of IT in Oman was compiled, and some of the lessons to be learned from past IT experiences were identified. Then various management aspects of IT that would need to be considered as national level IT projects developed, were explored through a series of short investigations. This prepared the ground for constructing a model for the management of IT development which will be presented in the following chapter.

The chapter is in two parts. The first part describes workshops, including the findings from them, which were conducted on three different topics. The second part describes how the findings from the workshop were investigated.

## 3.2 THE WORKSHOPS

The method of gathering information through workshops is comparatively little used in Oman. However some social science researchers have adopted similar strategies in qualitative research, such as group methods of organisation analysis (Steyaert & Bouwen, 1994). The method is based on a group of people meeting and talking to discuss social or internal organisation issues. A similar idea was adopted in this research.

The researcher was a member of IT in the government, and therefore had the opportunity to establish a good working relationship with senior Government officials, IT managers and the business community. This privilege allowed him to host workshops to explore various issues related to IT issues in Oman. The purpose of these workshops was to study the way in which IT has developed in Oman, by obtaining information from short talks presented by those who had been involved in the events, followed by group discussions. This was expected to show the rate at which circumstances had changed, the new management issues that had arisen, to identify local circumstances, and to record local achievements and failures. Other objectives achieved by holding the workshops were:

1. To implement "delivering research-as-you-go" to the sponsoring community
2. To establish a research relationship between the researcher and senior officials in the Government, IT managers and IT vendors

The following three workshops were conducted between March 1998 and June 1999:

1. IT history of Oman
2. Government Information Services in Oman
3. Government services stakeholders

**The method for organising workshops 1 and 2**

The following steps were followed to organize and collect results from the first two workshops.

1. Identify people who had experience in Oman IT and who would like to take part voluntarily in such a workshop.

2. Issue a pre-meeting questionnaire to those attending, to gain information concerning their involvement and interests.

3. Agree with all participants that the English language would be used during the workshop rather than Arabic, because some of the participants would be non-Arabic speakers.

4. Allow plenty of time for discussion. The discussion was facilitated by the researcher, with the help of an administrative assistant. The aim was to identify issues based on the experience of those present.

5. Two people were tasked to take notes of the discussion independently. These notes were then collected by the researcher and compared, and the findings summarized. These findings were then collated and sent to individual participants for their comments.

6. Once these comments were received, they were reviewed by the researcher and a second draft was compiled.

7. The second draft was then presented to a smaller group of people who had originally attended the workshop. Once they had reviewed it, the final document was produced and sent to all participants.

**The Participants**

Almost all government ministries, other government organisations and private sectors are located in the capital area, Muscat. There is a good working relationship between

most of the IT community members in Oman. These factors made it easier to establish communication with interested parties among these organisations.

The participants for all three workshops ranged from senior government officials, academics, senior IT managers, IT specialists to persons from the private sector. In each workshop there was at least one guest of honour; for example in the first workshop the guest of honour was the Minister of Oil and Gas and in the third workshop it was the Vice Chancellor of Sultan Qaboos University in Oman.

### 3.2.1 First Workshop - IT History of Oman (1970 - 1997)

This workshop was conducted in Oman on 30th March, 1998. The participants included the Minister of Oil and Gas as guest of honor, 4 senior government officials, 6 senior IT managers, 2 professionals, 2 IT users and 2 IT vendors. Each participant was sent a pre-meeting agenda, and it was stressed that the presentation and discussion should be related only to the past, rather than current and future IT in Oman. The agenda consisted of the following questions:

1. How did IT start in Oman?
2. What has IT contributed to the development of the country?
3. Which people have been influential in the development of IT?
4. What have been major milestones and/or defining events in the development of IT in Oman?
5. Which companies have played a major role in the development of IT in Oman?
6. What have been some of the major influential IT projects in Oman?

## Findings from the first workshop

### *IT in Oman from 1970 to 1980*

During this period the Government was heavily involved in building the national infrastructure of the country; schools, hospitals and roads, and the setting up of Ministries, were all considered as priorities. Information Technology was not considered at all. Telecommunications were managed by Cable and Wireless.

PDO[1] was the first organization to introduce computer systems to Oman. In 1972 the company installed an IBM mainframe computer system, which was mainly used by the Financial Department.

In the government sector, the Ministry of Finance introduced the first payroll system in 1976, but because they had no hardware, they were given the facility to use the PDO mainframe system. Eight expatriates were employed as computer specialists and operated the punched card system.

In 1977, the Ministry of Finance installed the first government hardware system (IBM/115) and the application was moved from PDO to the Ministry's computer centre.

During the 1970s, IBM was the dominant supplier of systems in the Middle East. Apple computers were just being introduced. All these systems were operated purely in English. Arabic software did not exist.

There was very limited schooling during the 1970s. Most of the students were sent abroad for degree studies. The need to study IT was not seen as essential. Many

[1] Petroleum Development of Oman (PDO), an oil company 60% owned by the Government and 34% owned by Shell, was and still is managed by Shell.

students studied different degrees. However, a few of them undertook Computer Science degrees.

***IT in Oman from 1980 to 1990***

The period from 1980 to 1990 witnessed many changes in the Ministries. Many of them became independent from the Ministry of Finance. The Ministry of Civil Service was established and it was responsible for setting up all employment rules and regulations for all Ministries.

From 1985 to 1990, on-line systems were rolled out to various Ministries (Payroll, Integrated Financial System).

During the early days of implementing its first system, (1982) the Royal Oman Police (ROP) utilised consultant support, complemented by a few Omani and expatriate employees. In 1985, the ROP introduced the IBM model 4381 and began development of its National Identity Card, Motor Vehicle Registration and Drivers Licensing systems. In 1988 a new, larger mainframe was installed, an IBM model 3090-150E water cooled system, and the existing systems were transferred to this system with a national network of some 500 terminal devices installed.

In health care, the implementation of IT was not very exciting. The introduction of computerised record keeping in the health-care field in Oman took place in 1987 only when the Royal Hospital was commissioned. There being no local experience or expertise in this particular field, the civil contractor for the hospital was also asked to provide the computer system.

Most hospitals' information systems available at that time were built around the hospitals' accounting systems rather than medical information. This did not work in Oman, where the majority of hospital health care is welfare-based. Education saw major development during the 1980s, when the Sultan Qaboos University (SQU) was opened and followed by two technical colleges.

*IT in Oman from 1990 to 1997*

The 1990s saw a completely new shift in IT with the computer, at least in many cases, being integrated into the daily routine of almost all ministries and other government organisations.

Many applications were developed. Oracle was, and is still, considered to be the dominant Relational Database Management System (RDBMS) in this region.

In the early 1990s the Apple Macintosh arrived. At the time this was the only desktop system offering applications in Arabic. However, various problems were experienced (networking, equipment sharing), both by Apple and the local agents, and the Macintosh never fully realised its potential. However, IBM type PCs had little to offer at that time. In the mid-1990s, Microsoft introduced Windows in Arabic, thus altering the Arabic market. In February 1995, MSOFFICE was arabised; in 1997 Windows NT was arabised; and in 1997 MSOFFICE 97 was launched with full Arabic support.

In 1991 the Ministry of Finance expanded its network to all regions in the Sultanate with more than 2000 terminals throughout, thus allowing an intranet concept ready for the future. The original Payroll system was replaced with the first phase of a Human Resources Management system.

In PDO, the 1990s saw a move back toward centralised computing, networked to users. Internal departments were then developing their own applications on desktop computers. Electronic mail took off and, in itself, become as indispensable as computing is in general. Automation in the field took place and the mobile office had arrived. Information Technology became now part of the corporate structure and the IT Department was a competitive service provider. Generally, there was now a much higher rate of computer literacy and a far greater dependency on computing in the company.

One of the most important events during that period was the formation of the Government Information Technology Committee (GITC) among IT managers in

Oman. This came about through individual, rather than Government, efforts. It was disbanded in 1992.

In June 1995 the Oman Government held a conference in Muscat chaired by the Deputy Prime Minister for Economic Affairs. He produced a long term strategy document, *Oman 2020 Vision* which included the following statement: "The main objective of the 2020 Vision entails the diversification of the economy and the development of new sources of income, optimal use of scarce resources and the development of a market economy characterised by laws and institutions that promote competition and efficiency". In the document IT was seen as a primary tool, which would enable major sectors in the economy, such as financial services, to be established. This was the first recognition of the importance of IT at top government level.

### 3.2.2 Second Workshop: Government Information Service

In April 1999 a second workshop was conducted to discuss the concept of a Government Information Service. At that time the term 'e-government' had not come into general use, but this workshop can be seen now to have been about e-government.

Both the Vice Chancellor of the Sultan Qaboos University and the President of the General Telecommunication Organisation of Oman were invited as guests of honour. Other participants were senior Government officials and senior IT managers.

The objective for conducting this workshop was to gather lessons related to the implementation of Government Information Service in Oman from the three main participating groups, financial, government organisations and private sector organisations. Findings relevant to these three sectors are reported as follows:

**Findings from the second workshop**

***Government Information Services from the Financial Sector's Perspective***

In Oman the banks had made tremendous progress since their early days. There had

been an enormous spread of Automatic Teller Machines (ATM) for customers to draw funds and check their accounts. ATM services were to be merged to form a single service which might then be linked to the national network and ultimately world-wide. A telephone banking service was also available. The Central Bank had automated cheque-clearing operations and they were planning to introduce Electronic Funds Transfer.

Banks had to consider the factors of privacy and confidentiality enshrined in the Banking Law of 1974. All future developments would have to take this into account carefully.

The age of smart cards and the internet would introduce greater competition for the banks, as large vendors began to introduce their own financial products and services to their customers. However, the banks were well placed to meet these challenges, enjoying as they did the trust and confidence of their customers.

***Government Information Services from the Government Organisation Perspective***

In Oman it appeared that whilst awareness of the necessity for action was beginning to dawn, it was too little to late. Government systems were fragmented and lacked a common strategy. Furthermore, IT departments in most government organisations were still treated as service providers and not as core elements within the organisations. Electronic service delivery by government would raise people's expectations, and the technology would need to be fast and robust, and had to be seen to be suitably secure. Electronic data sharing among Government organisations was now seen to be an important issue that had not been recognised previously.

Access to information by citizens could be an instrument for good or ill. There would be a major shift in the way the country operated, in what had become a world without borders, but one should not forget the social impact of this change. Access to knowledge would become a driver for prosperity. It was strongly recommended that the implementation of electronic service to Oman should be implemented in stages.

*Government Information Services from the Vendor's Perspective*

Electronic delivery of government services could have enormous political, social and cultural implications for the people of Oman. For successful implementation of such a service there needed to be in place relationships between the government and the private sector. In such a partnership both sides would share the vision, the objectives and the reasons for a project. This would provide a greater attraction to major hardware and software manufactures than simply providing them with a list of materials. In order to promote a peer relationship, government had to bring the private sector into the planning process. It needed to recognise that security is a feature that can be separated and remain under its control. It also needed to recognise that outsourcing can provide an efficient method of delivering IT services but should take a realistic approach to the cost of support services. For its part, the private sector should improve its technical skills and invest more in training programs to improve skill levels.

### 3.2.3 Third Workshop - Identifying electronic government services stakeholders

The objective of conducting this workshop was to identify individuals, groups of people and others who could benefit from or affect the implementation of electronic government services in Oman.

The process of identifying stakeholders was undertaken in two parts. Firstly the background publications about stakeholders were identified from the literature. Secondly brainstorming and Delphi techniques were used in the workshop to identify stakeholders.

**Background Publications on Stakeholders**

Mason and Mitroff (1981) define stakeholders as "... all the claimants inside and outside the firm who have a vested interest in the problem and its solutions". Martin

(1985) defines stakeholders or players as "... anyone with vested interest in the project objectives". Freeman (1984) defines a stakeholder as "... a group or individual who can have an effect on the achievement of the organisation's objectives". Claude (1988) suggests "... stakeholders can have a vested interest in a problem when they are in a position, through the resources they control, to influence the way the problem is formulated or solved". Martin (1985) uses "the 7 F's" to classify stakeholders types: Family, Friend, Fellow Traveler, Fence Sitter, Foes, Fools and Fanatics. There is also a broad divergence of views in the literature on how to identify stakeholders. Pouloudi and Whitley (1997) believe that, although the task of identifying stakeholders is complex, it is essential. Mason and Mitroff (1981) recommended using a systematic approach to identify stakeholders. Savage (1991), whose classification system was just mentioned, does not suggest any systematic way of identifying stakeholders.

Freeman (1984), and Eden and Van Hyden (1993) use the concept of stakeholders as a tool for examining the internal environment of a given organisation. Finally Wood, Wood-Haper and Rose (1995) suggest using stakeholder analysis as part of an interpretive framework for Business Process Re-engineering.

**Brainstorming and the Delphi techniques**

The third workshop used different methodology from the first two. Brainstorming and the Delphi technique were used to gather related information and to compile a list of the stakeholders.

Donelly, Gibson and Ivancevich, (1995), examined both brainstorming and Delphi techniques and found these to be useful in increasing the creative capability of a group generating ideas, understanding problems and reaching better decisions. Claude Banville, Landry, Martel and Boulaire (1998) supported the brain storming technique.

Donnelly et al. (1995) describe the Delphi technique as "The technique which involves the solicitation and comparison of anonymous judgments on the topic of interest through a set of sequential questionnaires that are interspersed with

summarised information and feedback of opinions from earlier responses. This process retains the advantage of having several judges while removing the biasing effects that might occur during face-to-face interaction".

Based on the above understanding, both techniques seemed to be appropriate for this research. It was therefore decided to adopt them.

The process consists of two stages: Stage 1 (brainstorming and Delphi techniques) and Stage 2 (Delphi techniques). The findings of both stages are reported below and a summary list of stakeholders is reported in Table 3.1.

**Stage 1 (Combined Brainstorming and Delphi)**

Three different groups of people, each group including a senior government official, an IT Manager, an academic, an IT consultant and the researcher, were invited to participate at different times. An invitation was sent to these individuals to attend a meeting and the reason given was "*to identify who would be the stakeholders, in the context of government information services in Oman'*. Stakeholders were defined as *"individuals or groups who can benefit or affect the implementation of services in Oman"*.

During the meeting each group was given a brief background about the subject and then individuals were asked to draw up a list of stakeholders. These lists were then grouped together into a single list, which was agreed on by all participants. The results of the first group were then presented to a second group at a different time, and the second group was able to add a few additional stakeholders. This process was repeated again with a third group, but this time they could not identify additional new stakeholders.

**Stage 2 (Delphi Technique)**

The list of stakeholders from the brainstorming was sent to nine different people: three senior government officials, two academics, one IT consultant and three IT specialists. These people had not participated in the brainstorming meeting.

The list was sent along with a covering letter including the stakeholder definition and, explaining the reason for identifying the stakeholders. As a result of this process, one new stakeholder was identified namely 'Tender Board' and added to the list. The list was reviewed and the same process was repeated, and after this second attempt no further new stakeholders were identified. At this point it was assumed that the list was complete.

**Table 3.1** Summary of findings

| List as of Stakeholders as a result of Stage1<br><br>(Brainstorm and Delphi) | List as of Stakeholders as a result of Stage2<br><br>(Delphi) |
|---|---|
| • Senior Government official<br>• Citizen<br>• IT managers<br>• IT professional<br>• IT users<br>• IT consultant<br>• IT vendors<br>• Regulators<br>• Ministry of Finance<br>• Ministry of Civil Service<br>• Ministry of Labour<br>• Royal Oman Police<br>• Educational Sectors<br>• GTO<br>• Private sectors | • Senior Government official<br>• Citizen<br>• IT managers<br>• IT professional<br>• IT users<br>• IT consultant<br>• IT vendors<br>• Regulators<br>• Ministry of Finance[2]<br>• Ministry of Civil Service[3]<br>• Ministry of Labour[4]<br>• Royal Oman Police[5]<br>• Educational Sectors<br>• GTO[6]<br>• Private sectors[7]<br>• Tender Board |

[2] The Ministry which centrally controls the budget; all projects including IT, must be approved by this ministry.

[3] The Ministry which is responsible for running and maintaining Human Resources Management System, for all civil service ministries.

[4] The Ministry responsible for issuing working permits for all expatriate labour.

[5] Besides its national security function, ROP is also responsible for issuing Visas, Driving licenses and National Identification numbers.

In producing the final list of stakeholders for e-government, shown in Table 3.2, it was decided to group together organisations such as the Ministry of Finance, the Ministry of Civil Service, the Ministry of Labour and the Royal Oman Police, as government organisations.

**Table 3.2** Final Lists of Stakeholders

| | | | |
|---|---|---|---|
| 1 | Citizen | 7 | Education sector |
| 2 | Decision makers | 8 | Private sector |
| 3 | IT managers | 9 | General Telecommunication of Oman |
| 4 | IT professional | 10 | Regulators |
| 5 | IT consultant | 11 | Tender Board |
| 6 | Government organisations | | |

This list is reviewed again while investigating the implementation of e-government in Oman, at a later stage of this research.

### 3.2.4 Findings from the three workshops

Issues identified through the workshops included: the need for the Government to re-establish the GITC or a similar body, the need for data sharing among ministries and other agencies, the need to improve the telecommunications infrastructure and the need to enhance the level of IT skill in Oman. Private sector organisations such as banks were seen to be moving faster than government organisations on implementation of electronic services. There was a potential problem on data sharing among government organisations, and a concern about the relationship between IT

[6] General Telecommunication Organisation (GTO), a semi-government organisation, is responsible for providing the whole telecommunications infrastructure in Oman.

[7] Private sector: Companies, Financial Institutions such as banks, factories and other business.

vendors and government organisations. Citizens had to be considered when introducing government services electronically and finally, eleven types of stakeholders were identified.

## 3.3 FURTHER INVESTIGATIONS

Based on the findings from the three workshops, the researcher decided to undertake further investigation into four important issues which emerged from the workshops. These were, data sharing among government organisations, the failure of a previously attempted inter-ministry initiative (the Geographical Information System), relationships between IT vendors and the Government, and public attitudes towards electronic delivery of Government services.

These four topics were investigated in different ways. The first study used an interview survey, the second and third were based on discussions with people concerned, and the final study used a questionnaire survey. The investigations and findings of each are reported below:

### 3.3.1 Data Sharing – Pilot Study

The need for data sharing between Ministries and other Government agencies was first raised as an issue of concern during the first workshop. The issue continued to be a theme at subsequent workshops and meetings with individual IT managers in the Ministries. It was therefore opportunity to select this topic for a pilot study on e-government.

Between 20th June and 28th July, 1999 the researcher visited IT managers and selected government officials in fourteen ministries and agencies, to record their views and concerns about data sharing. The list of ministries and agencies is shown in Appendix 3.1. Prior to the visits an outline of the topics for discussion was sent to each ministry and agency. This is shown in Appendix 3.2. The interviews were conducted in Arabic and were all tape-recorded to facilitate content analysis. The content analysis method was identical to that reported in Chapter 2, but inter-rater and

expert opinion checks were omitted this time. Open-ended questions were also asked in an attempt to capture views and issues not included in the agenda.

The study identified eight issues of concern relating to data sharing and broader government IT issues and these findings are summarised as follows:

**1. Willingness for improvement**

Extensive and significant motivation was found in ministries and agencies to develop the effective and efficient use of information technology for the benefit of the Government. Participants had identified that there is significant benefit to be gained from co-operation on IT issues between ministries and other government agencies.

**2. Duplication of effort**

There is much duplication of effort in aspects of data handling and application systems development and usage among ministries. An example was that in one ministry the same data was keyed in separately into two applications systems. Data from one ministry's database had to be viewed on screen and typed in the other ministry's database. Difficulties in transferring the data electronically were not only technical, but also arose from security and privacy considerations.

**3. Incompatibility**

Incompatibility issues between systems caused a number of problems. An example of such incompatibility being the difference between the IBM Arabic character set and another system such as Microsoft Arabic. If different applications from different ministries used different forms of Arabic, that would obviously hinder data interchange between ministries.

**4. Requests for Guidance**

A number of ministries were actively asking for guidance on a range of IT issues, and indeed, some indicated that they would delay their development programs if they knew that an integrated strategy was to be forthcoming in the near future. There was

currently no recognised authority for the ministries and agencies to contact or call upon for advice on IT issues. In the absence of such authority, many had begun their own initiatives.

### 5. Difficulties in Operations

Difficulties in operations existed where a ministry did not have access to up-to-date and accurate information for the execution of its duties. For example, some ministries were highly dependent on data from another ministry and manual updating caused delays and inconvenience.

### 6. Staff Shortage

IT departments in the ministries had difficulty attracting highly qualified graduates in comparison with IT departments in the private sector, which could offer higher salaries by giving higher starting points, or special increments and, occasionally, better promotion prospects. All Ministries embraced the principle of Omanisation[8], but it was noted that the salaries of graduates in IT departments, unlike their counterparts in Europe, did not progress significantly for the first few years after their employment. A perceived trend was the increasingly higher employment rewards offered by the private sector. This might further deprive the public sector of skilled personnel.

### 7. Individual standards

In the absence of an overall IT strategy as a source for IT guidance, individual ministries had defined or started to define their own standards and policies. For example it was found that almost all ministries visited were each assigning a separate unique identification to an individual. The obvious drawback to this was when the individual initiatives conflicted with each other.

[8] Omanisation is the name given to a policy of employing local people wherever possible in preference to ex-patriate workers.

**8. Information Security**

All ministries and agencies expressed concern on the issues of data security and confidentiality.

### 3.3.2 Case study: Geographical Information System (GIS)

The idea of implementing a Geographical Information System in Oman started in 1986. The main objective was to create a central government geographical information system, where data would be made available to all ministries that might need it. In spite of much effort to make this project successful, certain constraints such as lack of co-ordination, shortage of specialists, unavailability of high bandwidth telecommunication infrastructure, and lack of local training strategies made this implementation difficult. At the date of the survey, individual ministries had independent geographical information systems with no link among ministries and this project was considered to be unsuccessful.

### 3.3.3 Relationships between Government and IT suppliers

One finding of the third workshop was that there were problems in the area of IT procurement. A small investigation of this was conducted by the researcher, who visited local suppliers and buyers of IT, and collated their views on the issues.

It was found that some conditions affected the ability of the Government-Vendor relationship to contribute to the development of IT in Oman.

1. The need to look for expatriate staff because of the shortage of local skills meant the following:-

    - Culture and language differences impeded social interaction.
    - Short-term contracts of employment inhibited the building of long-term relationships based on trust. In addition to this is the view that the expatriates may only be in Oman for financial gain and therefore have limited long-term interest in the country.

2. The lack of efficiency drive within the ministries. The relatively cheap cost of employing of staff from the subcontinent may have removed any motivation for Ministries to improve efficiency through investment in computer systems.

3. Ministries had felt unable to trust local vendors, particularly those with temporary expatriate workers, and thus were reluctant to out-source their IT development.

4. The trading-culture heritage of the country meant that:

    - Computer systems were perceived as commodity acquisitions and goods and services procurement was largely price oriented.
    - Purchases had been based on the initial purchase price with little account taken of the long-term costs of ownership.
    - Local companies had been unwilling to invest for long-term gain, preferring short-term return. A particular example of this was reluctance to investing in training for expatriate workers.

5. Major manufacturers had not invested in Oman, relying on local representatives, who naturally had fewer resources.

6. There was a general feeling among vendors that various interests at decision-making levels may have meant that reasons other than merit were considered when purchases are made. This reduced their interest in pursuing the longer term IT infrastructure projects.

7. Predominately Asian expatriate staff meant that Arabic applications, to a large extent, could neither be produced nor supported by the vendor community.

8. Hardware vendors had dominated the acquisition of computer systems, with little attention being given to software as solutions to users' problems. In Oman, there was not a single successful software company.

9. Lack of money had not been seen as a fundamental problem; rather it was the case that priority had been given to non-IT developments perceived as being more strategic to the development of the country.

10. The commercial laws of Oman have been very strict. They are protective of the vendor, but have also stifled a competitive environment. A competitive environment could have brought about more rapid development.

### 3.3.4 Public attitude survey

This survey was intended to provide early feedback and a broad overview of the general public, on the following topics:

- Use of electronic services
- The willingness to contact the Government electronically.

The survey questionnaire was prepared in English and translated into Arabic, (Appendix 3.3) and then it was piloted. Data was collected and analysed and the results were tabulated using *Microsoft Excel.*

In May and June 1999, some five hundred survey questionnaires were distributed to citizens of the Muscat Capital Area and Dakhlia[9] region. Three hundred and thirty-nine (68% response rate) were returned completed. The respondents were asked about the use of several electronic services and devices from the ordinary telephone to electronic commerce. They were also asked about the potential use of electronic methods to contact the various Government ministries.

Overall there was a marked difference between Muscat and Dakhlia, with Muscat displaying a higher use in most categories. The ordinary telephone, however, seemed to be in almost universal use in both regions. The use of teletext and electronic commerce was negligible in both areas.

There was the huge impact of GSMs[10] and the Internet (Fig 3.1), particularly in Muscat. Over 80 percent of those surveyed in the Muscat area used GSMs and well

[9] Oman consists of three local states and five Regions.

Local states are: Muscat, Dhofar and Musandam and Regions are : Dakhlia, Sharkia, Batina, Al-Wasta and Dhahira.

[10] GSM: Global System Mobile (mobile telephone.

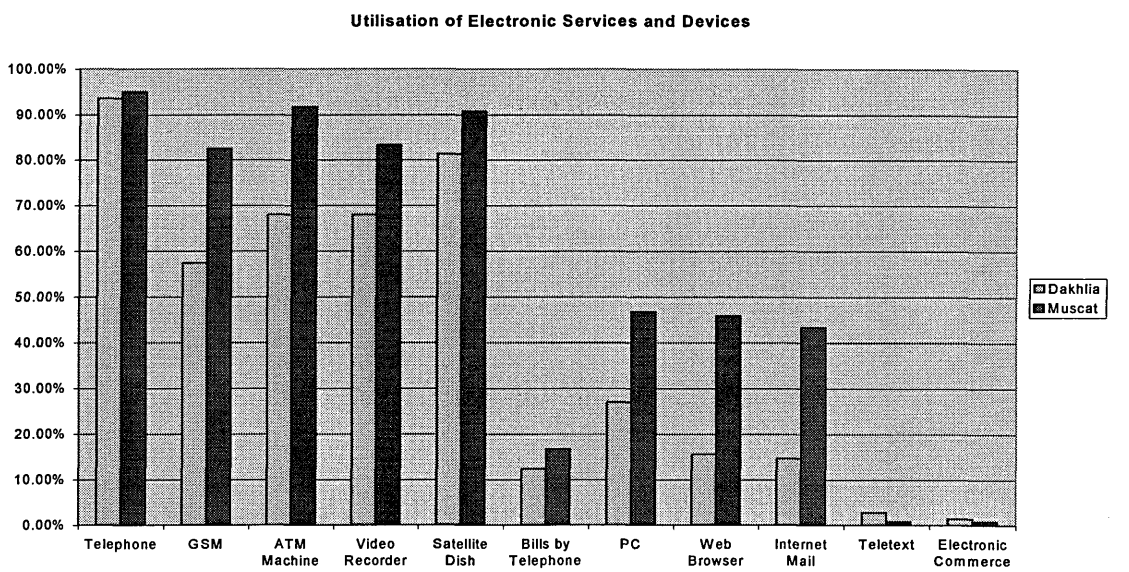
over 40 percent had a PC on which they access the worldwide web and communicated via electronic mail.

The effect of the banks in spreading the availability of electronic banking through a major network of ATM[11] machines is noticeable in a large percentage of users.

The use of teletext and electronic trading was almost 1 percent, which is to be expected because these services had not been fully implemented.

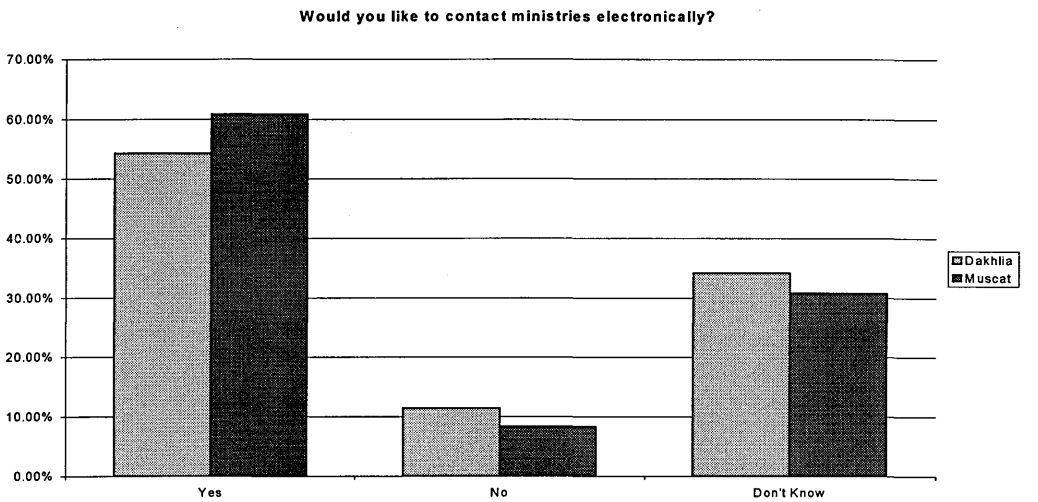
Not surprisingly, there was a majority in favor of electronic communications with Government ministries (Fig 3.2); 55 to 60% of respondents agreed, although a sizable proportion did not yet appreciate what this would entail, 30 to 35% of respondents didn't know.

Fig 3.1 Chart indicating the utilisation of electronic services




[11] ATM : cash machine

Fig 3.2 Chart indicating the willingness to contact the Government electronically




## Comments on the survey results

Generally speaking, the usage of electronic services had started to take place in Oman. A high percentage of people would use more of these services, provided that a reliable telecommunication infrastructure was in place. Willingness to contact the Government electronically would also increase, provided that there were awareness programmes in place to encourage the public.

## 3.4 SUMMARY

The idea of collecting information through a workshop was found useful, and the workshops achieved their objectives. The brief report on IT history in Oman highlighted IT issues for both IT and non-IT managers. An example was the need for the Government to re-establish the GITC or a similar body.

Further investigations were carried out following on from the workshops. Eight issues were identified from the data sharing pilot case. The Geographical Information System was seen to have been a failure, showing that it is not easy to establish such a national level coordinating project. Valuable lessons were also derived from the study of the Government and IT suppliers' relationship.

The implementation of an electronic government information service was seen as important in Oman, with a high percentage of people willing to contact the Government electronically in the future.

## 3.5 THE IMPORTANCE OF THIS STUDY TO THE RESEARCHER

As important from the researcher's perspective as the research findings were the effect on people's minds and that there arose a firm commitment to support and cooperate with this research. People also believed that the implementation of electronic delivery of Government services should be done in stages. This factor was considered when developing the e-government model.

Based on the several concerns highlighted by this research, there was a common and growing feeling revealing an urgent need to establish a National Information Technology Unit, which could be an authoritative body for IT in the Government of Oman.

Therefore, on 30$^{th}$ January 1999 the researcher submitted to His Excellency the Minister of the National Economy as an urgent recommendation, the establishment of a National Information Technology Board. The detail of the proposal is presented in Appendix 3.4.

Shortly after this a still more urgent matter came to the attention of the IT community, which was the Y2K problem (to be explained in the next chapter). This was a problem requiring consideration and action at a national level. Therefore a substantial exercise in e-government was forced upon the government by outside events. The researcher also informed the government about this issue and was asked to conduct a study to capture lessons from this event. This forms the subject of the next chapter.

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## Appendix 3.1 - Ministries and Agencies visited for the data sharing pilot study

| Date | Ministry Visited |
|---|---|
| 20/6/99 | Ministry of Civil Service |
| 29/6/99 | Royal Oman Police |
| 30/6/99 | Ministry of Education |
| 01/7/99 | Ministry of Finance |
| 02/7/99 | Ministry of Health |
| 03/7/99 | National Survey Authority |
| 04/7/99 | General Telecommunication of Oman |
| 10/7/99 | Diwan of Royal Court |
| 14/7/99 | Ministry of Commerce and Industry |
| 19/7/99 | Ministry of Foreign Affairs |
| 20/7/99 | Ministry of Housing |
| 24/7/99 | Ministry of Defense |
| 26/7/99 | Ministry of Justice |
| 28/7/99 | Ministry of Social Affairs and Labour |

## Appendix 3.2 - Interviews agenda in the data sharing pilot study

*To enable me to undertake this study, I would like to gain information from you in the following areas:*

- Your organisation:
  - Its role and function
  - Its principal relationship with other ministries and agencies
- Data held by your organisation
  - A description of any data which you believe might be of interest to other ministries or agents
  - The source and potential recipients of such data
- Data which you may currently share with any other organisation
  - Any data duplication of which you are aware
- The staff resources which you feel would need to be committed to data interchange:
  - Skills you believe would be needed for data sharing projects
  - Availability of such skills within your organisation
- Future development in data sharing, including:
  - The change currently foreseen
  - Your organisation's plans for holding data over the following five to ten years
- Benefits of data sharing, including:
  - The benefits you feel would be to
    - Your organisation
    - Other organisations
- Potential issues and difficulties, including:
  - Any problems you foresee with data sharing, e.g. ownership issues
  - Any other issues which you feel are relevant
  - How you believe these problems can be overcome

## Appendix 3.3 - Public Attitude Survey Questions

PLEASE GIVE US A FEW MINUTES OF YOUR VALUABLE TIME AND ANSWER THE FOLLOWING QUESTIONS:

1. AGE: *TICK THE APPROPRIATE BOX BELOW:*
   15- 24 ☐ 25-40 ☐ 40+ ☐
2. PROFESSION: *TICK THE APPROPRIATE BOX BELOW:*
   EMPLOYEE ☐ STUDENT ☐ OTHER ☐
3. WILLAYAT:.....REGION/MUHAFADHA.....
4. WHAT KIND OF ELECTRONIC SERVICES ARE YOU USING? PLEASE TICK THE APPROPRIATE BOXES:

| | TYPE | YES | NO |
|---|---|---|---|
| 1 | NORMAL TELEPHONE | | |
| 2 | GSM | | |
| 3 | ATM MACHINE | | |
| 4 | VIDEO RECORDER | | |
| 5 | PAY BILLS FROM YOUR PHONE | | |
| 6 | SATELLITE DISH | | |
| 7 | PERSONAL COMPUTER | | |
| 8 | INTERNET WEB BROWSER | | |
| 9 | INTERNET MAIL | | |
| 10 | TELETEXT | | |
| 11 | ELECTRONIC TRADING | | |

5. DO YOU WISH TO CONTACT MINISTRIES ELECTRONICALLY IN THE FUTURE? *TICK, AS APPROPRIATE, BELOW:*

| YES | NO | I DON'T KNOW |
|---|---|---|
| | | |

## Appendix 3.4 - Proposal for the establishment of National Information Technology Body

*This is a translated paper, the original was in Arabic. It was sent by the researcher to His Excellency the Minister of Economics, on 30th January 1999 and as result the National Y2K Task Force was established on 22nd February 1999 and the NITC was established later on.*

### Background

In the last decade, the rate of technological development, coupled with cost reduction and product improvement, has resulted in a wide range of new and improved services. It is anticipated that, in the years ahead, three trends will characterise IT development for all markets: Globalisation[12], Multimedia[13] and Economic leverage[14].

The governments in most developed countries have made every endeavour to use information technology (IT), which supports services to the public and business across the full range of government functions. To achieve these goals, plans and strategies are governed by authoritative bodies which have been established for this purpose.

[12]Globalisation: National borders are becoming less and less relevant to technology.

[13] Multimedia: One of the most dynamic forces of change is the convergence of telecommunication, computer, broadcasting and information services.

[14] Economic leverage: Telecommunication bandwidth - its availability and cost as a commodity is very cheap. For this reason telecommunication is now recognised as the technological underpinning, as is now evident in its consistent inclusion in all world wide trade agreements. Example: Inclusion of software application in the World Wide Property Organisation (WIPO) copyright recommendations.

In 1989 the Sultanate of Oman was one of the countries which promptly responded to this idea by forming the "Government Information Technology Committee" comprising members from different government organisations.

This committee was aspiring to establish a centre for government information, but abandoned and broke up in early 1992. Nevertheless, we should not forget its many achievements:

- It had worked in co-ordination with the Faculty of Science at the Sultan Qaboos University for the development of the curriculum for computer related courses.
- It had held technical computer courses for a large number of technicians working in most of the Sultanate's ministries.
- It set the initial codification standard for towns and villages in Oman.

All IT sector development initiatives are initiated by the national IT focal point, which is to be the "Unit of National Information Technology" (UNIT). This is the embodiment of a nation's IT vision and strategy. Other national models exist in many countries e.g. UK (CITU), Singapore, Canada, Australia, Ireland and Bahrain. It is, however, important to note that whilst these models contain valuable features which may be adopted, each model is unique to its own nation. Thus the model for the Sultanate of Oman must be a uniquely Omani model.

Accordingly, it is now appropriate to reconsider this subject. I suggest re-establishing such a body to be named the "Unit of National Information Technology". It should be under the supervision of a governmental organisation such as the Secretariat General of the Cabinet, the Ministry of National Economy or any other appropriate authority. Initially UNIT should not be a large organisation. Such a body can start with a very small team of people, say 4 to 5 permanent staff. These might consist of a unit director, two technical experts, an administrative expert and a co-ordinator. These numbers can be increased later as necessary. It is also recommended that there should be non-permanent members of Omani staff who are well-experienced in government

IT. These members can be chosen from among the senior IT directors in the governmental organisations and they can be involved according to the needs and requirements.

Typical objectives and functions of such UNIT may well be:

- To develop and maintain government policy and strategy for Information Technology (IT) as a cohesive element of national development plans.
- To co-ordinate all aspect of IT in the Sultanate of Oman.
- To set standards for :
  - data definition and codification
  - software and hardware capability and procurement
  - application development
- To promote data sharing and co-operation in IT matters between all Government Ministries and other organisations.
- To monitor the overall development and application of IT or similar in Oman.
- To promote the development, growth and profitability of the Omani IT industry.
- To achieve the maximum possible level of indigenous Omani employment (Omanisation) in the IT sector.
- To work in a complementary partnership with the IT sector to maximise revenue potential in domestic and export markets.

*To achieve the above objectives, (UNIT) should perform the following tasks and activities:*

- Liaising with and advising Government in all matters relevant to the IT sector's development.
- Liaising with the educational (University and technical colleges) and vocational training institutions to ensure a ready supply of IT professionals.

- Participating in the drafting of an "Omani Information Technology Strategic Plan", or at least a white paper "IT Direction" document
- Recommending to the Government a workable "Copyright Protection Law" to conform with the recommendations of the "World Property Intellectual Organisation" (WIPO).
- Facilitating linkage/subcontracting opportunities between Government and local IT firms.
- Identifying and disseminating potential niche export market opportunities particularly within the Gulf Co-operation Council (GCC) countries, as well as within the wider Arab world regions.
- Preparing a promotional brochure and directory of the Omani IT sector and updating it regularly.
- Organising IT exhibitions and seminars targeted toward local and regional potential end-user attendance.
- Functioning as an information source for global IT trends/opportunities.
- Promotion of "open" Arabisation standards for IT products.
- Liasing with international and regional IT bodies and organisations.
- Any other IT tasks with which the UNIT may be charged.

UNIT can be considered as the basis for the establishment of the future "e-government" in Oman. I am carrying an academic research study to help setting a road map for application of e-government in Oman.

The Government should earnestly take the establishment of the UNIT into consideration. It is preferred that this should be before the end of 1999, so that the UNIT can take part on confronting the year 2000 problem (Y2K problem).

# CHAPTER 4

# POST COMPLETION REVIEW OF THE OMAN NATIONAL Y2K PROJECT

## 4.1 INTRODUCTION

The Oman national Y2K project (Y2K is an abbreviation for "the Year 2000") was monitored during its establishment and operation, and reviewed after completion.

The Y2K problem started to claim the attention of organisations all over the world from 1995 onwards. In early computer systems, memory was in short supply and the memory space allocated to dates was only enough to allow dates up to the end of the year1999. This meant that at the start of the next millennium, date-dependent programmes would cease to function properly. An unknown amount of software written 30 or 40 years ago was still functioning, buried in modern systems. Initially, many organisations believed that the scope of the Y2K problem was limited to computer hardware and software. However, it was soon realised that the scope of the Y2K problem included the checking and correcting of automated plants, machinery and equipment, which used embedded systems having date functionality. Organisations realised that if the problem was not resolved then it could pose a threat to their business continuity.

All key organisations, in addition to making themselves Y2K compliant, started monitoring the Y2K readiness status of their business partners, facility providers and all those organisations on which they were dependent. Business continuity of organisations was also dependent on the basic infrastructure facilities, which are a concern of government.

In view of the threat posed by the Y2K problem and the need for its resolution by all organisations, whether government or private, it became necessary for almost every

country, including the Sultanate of Oman, to provide a platform at the national level to ensure that:

- All key organisations were Y2K compliant.
- The country's basic infrastructure services were well prepared to provide services to the public and organisations with minimum possible disruptions in the transition to the new millennium.
- There was no impact on the nation's economy and the country was able to maintain its image in the world.

In this chapter the research focuses on what was learned from the Y2K phenomenon as it was manifested in Oman.

## 4.2 REASONS FOR SELECTING THE Y2K PROJECT FOR INCLUSION IN THIS RESEARCH

1. Part of the reason for Oman's fairly healthy position in Y2K was that its use of IT and electronic control systems was as yet not very extensive. It was reasonable to assume though, that Oman's dependence on such systems would increase significantly in the future. Certainly, any exploitation of e-government would increase this dependence. There was therefore merit in understanding better any risks inherent in the use of these systems and how to deal with them.

2. The National Y2K project was the first national IT project in Oman to involve a large number of organisations and individuals at various levels, including the public. It was important to capture the lessons to be learnt from this project while it was still fresh in people's minds and records were available.

3. The national Y2K program increased awareness of possible risks to national infrastructure. Implementation of e-government in the future might involve the identification of similar risks.

4. Some countries had reviewed and changed their commercial laws under the influence of the Y2K problem, e.g. laws governing IT acquisition and supply. The same might apply to e-government.

5. To succeed with the Y2K problem required management support, coordination and collaboration at all levels, and created opportunities for collaboration between government organisations, government to business and government to public. This was thus a valuable opportunity to study such interactions.

## 4.3 SCOPE

This study addresses only the Oman Y2K initiative and the lessons learned from it. It does not cover other countries' experiences.

## 4.4 HISTORY OF THE NATIONAL OMAN Y2K PROJECT

The Sultanate of Oman had been monitoring developments concerning the Y2K problem all over the world since 1996. It was also aware that some of the critical organisations in Oman such as the Ministry of Finance, Banks, and Oil companies such as Petroleum Development of Oman (PDO) had started Y2K compliance work in advance of this.

Individuals including the researcher expressed their concern about Y2K to Government officials, and in late 1998 the Sultanate of Oman recognised the need to set up a national committee with the following objectives:

- To prioritise organisations in order of their importance to the national economy, social and security aspects.

- To assess the extent of Y2K compliance in key areas of infrastructure such as telecommunication, electricity and other utilities.

- To assist key organisations in solving the Y2K problem.

### 4.4.1 Formation of the National Y2K Task Force (NTF)

In January, 1999 the Sultanate of Oman's Cabinet Office appointed a Minister of National Economy to set up a National Y2K Task Force. The Task Force comprised nine members selected from different government and private organisations in Oman and was set up in February, 1999. The researcher was one of these. Task Force members were assigned on a part time basis to the National Y2K Project but still carried out the duties assigned in their parent organisations on almost a full time basis.

After initial visits in March, 1999 to various key organisations such as government ministries, the National Y2K Task Force (NTF) reported the following:

- Many Government organisations could afford no time to prepare adequately for Y2K.
- Many Government organisations would need additional financial resources to replace or upgrade equipment and to pay for Y2K consultancy services.
- It would be useful to carry out an audit by a third party of Y2K compliance work done by government organisations.
- There was a need to create a centre with full time staff, which could carry out work on behalf of the Task Force.

Independently in April 1999, the Minister of Commerce and Industry expressed strongly the need to create a Y2K Response and Resource Centre to address the needs of private sector organisations.

It was felt that it would be difficult to separate the Government and private sectors and therefore on May 25, 1999, the Cabinet approved the setting up of a single Y2K Resource Centre, under the direction and guidance of the National Y2K Task Force.

The centre was given the following remit:

- To raise awareness about Y2K among the public and within organisations and to deal with the Y2K related queries of people in Oman.

- To prepare contingency plans for critical sectors as defined by the NTF
- To set up a command and control centre ready for 31st December 1999.
- To provide guidance on carrying out Y2K compliance and contingency planning work for organisations in Oman.

### 4.4.2 Establishment of the Y2K Resource Center

The staffing, budget and tasks of the Y2K Resource Centre were agreed in July 1999. Subsequent to this, twelve people were appointed and approximately twenty million US dollars was allocated.

One function of the Resource Centre was to collect together on a day-to-day basis information on what progress different sectors - government, business and public service - were making toward being ready for Y2K.

The Resource Centre was also entrusted with additional responsibilities at later stages for facilitating and managing the production of a national contingency plan. This activity was added in July 1999. In August 1999, they were also asked to set up an audit on compliance and contingency planning to:

- Provide independent and unbiased evaluations of strengths, weaknesses and status of Y2K programmes in the Ministries and key private sector institutions;
- Provide links to international resources and Y2K information worldwide.

### 4.4.3 Establishment of a Command and Control Center

The Royal Oman police was responsible for dealing with national emergencies. Therefore in September 1999 the National Y2K Task Force recommended to the Cabinet that it should set up a Command and Control Centre to manage events on 31st December, 1999, with the Royal Oman Police (ROP) to handle any kind of eventuality arising from Y2K. The Cabinet agreed this request. An advantage of this

was that it provided a good opportunity for the Royal Oman Police to review their general contingency planning.

### 4.4.4 Formation of Sector Contingency Planning and Implementation Teams

To facilitate managing the problem, nine key sectors were identified, namely: Electricity & Water, Communication Services, Oil & Gas, Health Services, Banking & Finance, Commerce and Industry, Air Transport, Sea Transport and Public Safety & Security. Sector Contingency Planning Teams comprising representatives from key organisations in each sector were set up in August, 1999 by the National Y2K Task Force to prepare contingency plans for each sector. A total of about 55 persons were involved.

### 4.4.5 Formation of National Contingency Planning Teams and Implementation

The National Task Force also formed a National Y2K Contingency Planning Team headed by the Royal Oman Police to address inter-sector issues and prepare a national Y2K contingency plan. This comprised the heads of the nine sector teams plus the head of the Royal Oman Police.

### 4.4.6 Appointment of Y2K Coordinators

The Y2K Committees in each organisation played a crucial role in making their respective organisations Y2K compliant and the coordinators provided the interfaces between their respective organisations and the National Y2K Task Force, the Y2K Resource Centre and the Sector Contingency planning teams.

### 4.4.7 Setting up the Audit team

An audit for Y2K compliance and Contingency Planning work was carried out for all crucial ministries and organisations. This task was assigned in August 1999. An audit team, comprising eight auditors, was hired for a 6 to 8 week period.

### 4.4.8 Achievements

The best proof that the Y2K project was successful comes from the observation that the Sultanate of Oman entered the new millennium without noticing a major problem. Quite large numbers of Y2K "fixes" had been made in all sorts of organisations as a result of the publicity and the advice provided. At the millennium end only minor incidents were reported, which had very little impact. A complete work force in all critical organisations all over the country was fully equipped and alert during December 31, 1999 to January, 2000 to face any unforeseen circumstances. It was a properly coordinated effort at country level. The National Task Force and the Y2K Resource Center completed all the tasks assigned to them under very tight time schedule and resource constraints. All the assigned tasks were completed by December 31, 1999.

Despite this success, the intention was to monitor this first national scope IT project in order to learn lessons for such projects in the future. The researcher did uncover these lessons following the academic method reported below.

## 4.5 RESEARCH METHOD

The post completion review of the Y2K project involved two stages. Firstly relevant documents available from the Y2K Resource Centre and elsewhere were examined and relevant areas of concern were identified. Secondly a review was conducted with people involved in the Y2K project which revealed two more areas of concern.

### 4.5.1 Examining archive documents

The study of official documents was one approach used to collect data for this part of the research. Stake (1995:68) notes, that "gathering data by studying documents follows the same line of thinking as observing and interviewing". For this research thirteen types of documentation available from the Resource Centre were examined. Important key issues were extracted. For example the issue of co-coordinating among members of the Task Force and individual members in ministries was always highlighted. Similarly budget constraint was always mentioned.

**The thirteen types of document are as follows;**

1. General correspondence
2. Minutes of Task force meeting
3. The National Contingency Plan
4. Sector Contingency Plans
5. Status reports for various organisations
6. Minutes of Sector Contingency Planning Team meetings
7. Resource Centre Activity Reports
8. Resource Centre Visit reports
9. Audit reports
10. Inventory and other supporting documents
11. Summary Reports
12. Presentations
13. Web site activity

As a result of this analysis, eight key areas of concern were identified. These areas were planning, co-ordination, contingency planning, IT dependence, governance, managing the inventory, and budgeting. Then the researcher conducted a review of publications from the rest of the world, and two more areas of concern were found, as explained in the next section.

### 4.5.2 Review of general publications on Y2K

A number of substantial reports were published by international bodies during the Y2K period. According to McConnell (2000), a report published by the International Y2K Cooperation Centre (The IY2KCC is a United Nations backed group funded by the World Bank) on monitoring of Y2K events, Oman was classified as ready to deal with the Y2K problem.

The study conducted by United States General Accounting Office, GAO/AIMD-00-290 for Y2K lessons learned, identified a number of management practices that contributed to Y2K success. These include: top-management attention, risk analysis, project management, development of the inventories system and business continuity planning. Similarly Info (2000) reported that lessons learned from the year 2000 experience are in the areas of governance, project management and risk management".

Braithwaite (2000), argued that many "..organisations struggled to resolve the Y2K problem simply because historically those organisations had failed to manage their IT". He suggested that Y2K lessons learned needed to be taken seriously if organisations were to improve and sustain their management of IT.

The review of these publications resulted in uncovering two new areas of concern which were not discovered in the document analysis: Project management and Risk management.

The next stage was to conduct the empirical study, to discuss these ten areas with people involved in the Y2K project in Oman.

### 4.5.3 Empirical Survey Study

The ten areas identified were used to develop an interview agenda to obtain feedback from people involved in the project, in order to:

- Confirm the findings from documentary sources
- To discover unknown issues or new issues

This post Y2K survey was carried out in Oman between January and February 2000. The study used the semi-structured interview technique. The aim was to capture key lessons with people actively involved in the national Y2K project. The interview agenda was developed in stages. Firstly a draft was piloted with two consultants working with the National Y2K Task Force. Their feedback and suggestions were used to compile a second draft of the interview agenda.

The second draft interview was reviewed with an academic from the Sultan Qaboos University who suggested minor changes, which were included in the final version of the questionnaire. A copy of the interview agenda, which is translated into English, is available at Appendix 4.1.

Sixty people were contacted to participate to this exercise, including nine members of the task force (TF), seven member of the Y2K Resource Center (RC), twenty five members of the National and Sector and contingency Planning Team for Y2K (NCP) and twenty one members of Coordinators from Ministries (CM). Because of the Y2K pressures and their working commitments, only 55% of the people agreed to participate in the interviews. The breakdown of the individuals is shown in Table 4.1 below;

**Table 4.1** The breakdown of participants to the interviews

| | TF | RC | NCP | CM | Total |
|---|---|---|---|---|---|
| People asked to participate | 9 | 7 | 25 | 21 | 60 |
| People agreed to participate | 9 | 5 | 12 | 7 | 33 |
| Response percentage | 100% | 71% | 47% | 33% | 55% |

The interviews were conducted in Arabic for a period of 60 minutes each and were all tape-recorded to facilitate content analysis. Statements from the thirty three interviews were translated from Arabic and each statement grouped under related headings called "areas of concern".

### 4.5.4 Reliability testing

Four tapes were selected randomly to be analysed by another person. An Arabic speaking consultant from the World Bank who had experience with academic studies was asked to assist in listening to the interviews and deriving key lessons. The lists of findings were then compared as shown in table 4.2 below;

**Table 4.2** Areas of concern found by researcher and rater

| Tape | Researcher Findings | Rater Findings | New area of concern |
|---|---|---|---|
| 1 | 12 | 8 | 0 |
| 2 | 12 | 11 | 0 |
| 3 | 9 | 7 | 0 |
| 4 | 10 | 8 | 0 |

The researcher found two new areas of concern: Development Of Skills and Publicity. The second rater found no new areas of concern. The list of findings was then given to a senior member of the Y2K Task force who did not recommend any further areas of concern.

## 4.6 FINDINGS - KEY LESSONS LEARNED OVERALL FROM THE REVIEW OF Y2K

Twelve areas of concern were identified as result of this review of Y2K which are likely to be relevant to the introduction of e-government. These areas are listed below together with participants' views:

### *4.6.1 Planning*

Participants felt that the Government should have established the Y2K project well in advance, and that members of the Task force should have been appointed and been given enough time to plan. The participants were concerned that the e-government project might be established without considering the planning of it.

### *4.6.2 Co-ordination*

Participants were concerned about the lack of co-ordination between some members of government organisations. This was explained as due to a lack of awareness in higher management, complicated administrative procedures and a variation in priorities between one organisation and another. Participants felt that acceptable co-ordination at working group level was achieved by constant informal contact between members.

### *4.6.3 Development of Oman's skill base*

Participants felt that the Y2K national project proved to be a vehicle for improving the skill base within Oman. It was necessary to retain or to develop a core group whose task would be to measurably improve the quality and success of national projects. They believe that the ability to direct and manage national or large projects requires high skill that improves through experience.

### *4.6.4 Project management*

In general, the participants felt that the project management and methodology adopted for the Y2K project was ineffective, especially within the Ministries.

### *4.6.5 Contingency Planning*

Contingency planning for business continuity was seen as necessary to reduce the risk and potential impact of Y2K failures. Reasonably high quality National and Sector contingency plans to deal with any unforeseen problems at National level were completed and implemented in a timely manner.

### *4.6.6 Dependence on Information Technology*

The Y2K reveals that, there was high degree of dependence on Information Technology in almost all organisations and participants felt that this dependency needs to be managed properly. They also felt that IT must be fully integrated with an organisation's business and internal processes.

### *4.6.7 Risk Management*

Participants note that perception of risk varied between government organisations and business. They believed that business always equated risk to money. However, it was not quite clear what government organisations could equate risk to.

### *4.6.8 Governing the National Project*

Participants felt that, establishing the Y2K initiative from Cabinet level, the high level in the Government was crucial for success. They also felt that any other complex national government project such as e-government would need similar support.

### *4.6.9 Management of inventories*

Y2K provided an opportunity for most organisation to build inventories of their IT and related systems. Procedures will be needed to maintain these inventories if their value is to be considered in the future. Much the same applies to supplier lists and

license management. These assets would be useful when implementing e-government projects.

### *4.6.10 Infrastructure concerns*

The general feeling of participants was that the current telecommunications infrastructure in Oman was not adequate to handle large and complex national projects. They believed that future IT dependent systems would work best on stable, simple, resilient and flexible infrastructure.

### *4.6.11 Budget Planning*

Participants felt that the National Y2K project was completed well within the budget allocated for the project. This was achieved because the National Y2K Task Force had very carefully evaluated the funding bias received from various Ministries and as far as possible allocated the money actually needed. The money was spent on procurement of assets, upgrading of the technology and the setting up of contingencies.

### *4.6.12 Publicity*

Participants felt that public awareness of the Y2K issue was initially very poor. This was improved later by using TV, Radio and newspapers for publicity. They suggested that for national projects within the Sultanate, the use of the Ministry of Information seems the obvious choice. The Ministry of Foreign Affairs should also be involved if diplomatic or international publicity is an issue.

## 4.7 SUMMARY

This research has identified twelve areas from which lessons can be learned as a result of the Y2K national project. The research provides a useful insight into how the government and business community can address future issues. Y2K helped the leadership to understand the importance of Information Technology and it created an opportunity for forming a partnership between the public and the private sectors, which could be of great advantage in reaching a common goal when the Government embarks on another national project such as e-government. Planning was seen to be very important for national projects, such as e-government. Co-ordination between different parties in the Government organisations will be essential in establishing the basis for an e-government project.

Improving the skills base locally, particularly the capability to successfully manage large projects, will enable the Government of Oman to initiate large IT projects, such as e-government.

Monitoring the risk throughout the year 2000 provided a context for identifying and managing concerns and potential issues. This approach will be critical when introducing a complex project such as e-government.

Y2K contingency planning was done successfully. This approach could the basis for a comprehensive National Contingency Planning to handle disaster situations in future.

General public awareness was not adequately addressed; an e-government project will require better publicity to the citizens.

The next chapter will review different published e-government models, and propose a more advanced one.

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- IEEE-Computer Society: http://www.computer.org/standard/pasc/y2draft.htm
- International Civial Aviation Organization (ICAO): www.icao.int/y2k
- Institution of Electrical Engineers: http://www.iee.org.uk/2000risk/
- International Organization of Securities Commissions (IOSCO): http://www.iosco.org/year_2000.html
- International Telecommunications Union (ITU): http://www.itu.ch/y2k/
- Organisation for Economic Co-operation and Development and (OECD): http://www.oecd.org/dsti/sti/it/infosoc/news/y2k.htm
- United Nations: Information Technology Services Division: Available at: www.un.org/members/yr2000/; United Nations Development Program
- World Bank: Available at: www.worldbank.org/y2k/;

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| | |
|---|---|
| **Albania** National Y2K Site http://www.inima.al | **Ireland** http://www.2000aware.ie/ |
| **Algeria** National Y2K Site http://www.y2k.net.dz | **Italy** http://www.comitatoanno2000.it |
| **Angola** National Y2K Web Site www.y2kangola.ao | **Jamaica** http://www.cabinet.gov.jm/y2k.htm |
| **Argentina**http://www.sfp.gov.ar/2000/2000.html | **Jordan** http://www.y2k.gov.jo |
| **Armenia** Academy of Sciences | **Malaysia** http://www.y2k.gov.my |
| **Aruba** http://www.aruba2000.org | **Mauritius** http://ncb.intnet.mu |
| **Australia** http://www.y2k.gov.au/html/index.html, | **México** http://www.amiti2000.org.mx/ |
| **Austria**http://www.wifi.at/tub/2000 | **Netherlands** http://www.mp2000.nl |
| **Canada** http://www.info2000.gc.ca/ | **New Zealand** http://Y2k.dia.govt.nz/ |
| **Croatia** http://www.2000.hr | **Norway** http://odin.dep.no/aad/publ/aar2000/index.html |
| **Cuba** http://www.islagrande.cu/y2k/homeie.html | **Oman** www.oman-y2k.gov.om |
| **Denmark** http://www.fsk.dk/fsk/div/aar-2000/ | **Pakistan** www.pcb.gov.pk |
| **Ethiopia** http://www.telecom.net.et/~ncic | **Peru** http://www.inei.gob.pe/pia2000/ |
| **Fiji** http://www.y2kfiji.com | **Singapore** http://www.ncb.gov.sg/ncb/yr2000/index.html |
| **Finland** http://www.iki.fi/~jpatokal/y2k/ | **South Africa** http://www.y2k.org.za |
| **France** http://www.an2000.gouv.fr/ | **Spain** http://www.map.es/csi/2000.htm |
| **Georgia** http://www.y2k-pmu.kheta.ge | **Switzerland** http://www.ie.iwi.unibe.ch/zobis/jahr2000/ |
| **Germany** http://www.iid.de/jahr2000/ | **Thailand** http://www.y2k.nectec.or.th |
| **Hong Kong** http://www.year2000.gov.hk/ | **Turkey** http://y2000.dpt.gov.tr |
| **Hungary** http://www.itb.hu/fejlesztesek/2000/ | **United Kingdom** http://www.open.gov.uk/year2000 |
| **Iceland** http://www.skyrr.is/2000/ | **United States** http://www.y2k.gov |
| **India** http://www.doe.gov.in/~doe/y2k.htm | |

## APPENDIX 4.1 – INTERVIEW AGENDA

Interview for Feedback on National Level Y2K Project

Name: _____ Date: _____

Role: _____

Q1. Did the Sultanate of Oman achieve the objective? *Yes* *No*

Comments, if any.

Q2. Was the Y2K National Task Force formed at the right time? *Yes* *No*

Comments, if any.

Q3. Was the co-coordination with various key government and private organisations involved in Y2K work effective? *Yes* *No*

Comments, if any.

Q4. Was the methodology adopted for managing Y2K effective? *Yes* *No*

Comments, if any.

Q5. Has the Y2K project created sufficient awareness about business continuity planning? *Yes* *No*

Comments, if any.

Q6. Has Y2K played any role in creating a degree of dependence on IT in the organisations? *Yes* *No*

Comments, if any.

Q7. Was any risk assessment carried out during Y2K project?

*Yes* *No*

Comments, if any.

Q8. Did theY2K project get sufficient support from the senior level in the Government? *Yes* *No*

Comments, if any.

Q9. Did the Y2K project to create an opportunity to carry out inventory?

*Yes* *No*

Any comments?

Q10. Was the telecommunication infrastructure adequate during Y2K project?

*Yes* *No*

Any comments?

Q11. Was the funding allocated to the Y2K national project sufficient to meet the requirements? *Yes* *No*

Any comments?

Any other lessons.....?

# CHAPTER 5

# MODELS FOR E-GOVERNMENT

## 5.1 INTRODUCTION

The first section of this chapter reports examples of e-government initiatives from around the world. In the main part of the chapter, models from around the world for the management of the development of e-government are introduced and discussed. The models are classified into three groups: those that measure how ready a government is to start delivering e-government services, those that measure how far a country has progressed with the introduction of e-government and those that are called maturity frameworks. The Maturity framework concept will be explained in section 5.5 below.

The management models to be described are the Capacity check model, the Gartner model, Europe's model, IBM's self-assessment tool, the Cap Gemini model, the IDA model, the Elsevier model and the Accenture model.

The maturity frameworks are the Carnegie Mellon Process Maturity Framework, the Shell Information Security Maturity Framework, and the UK Post Office ASSURE Information Maturity Framework.

The information from this review will be used as the basis for proposing a new and more comprehensive model in the following chapter.

## 5.2 E-GOVERNMENT INITIATIVES

Fraser-Moloketi (2003:1) stated that "When people interact with government, they want to do so on their own terms. They want high quality services, which are accessible and convenient. Hence governments the world over are under pressure to improve service delivery." After Y2K, the focus for many countries was to embark on electronic delivery of service through their "e-government initiatives".

In the United Kingdom for example, as part of its e-government initiative, the United Kingdom Government published The Modernising Government White Paper in 1999. This established a framework for fundamental changes in the way the government departments will operate in the future. They also set an electronic service delivery target of carrying out 100% of government services electronically by 2005 (Central IT Unit, 2000).

Holmes (2001) pointed out that Singapore through its eCitizen Center now ranks as the most advanced country in the world in providing online services to its constituents.

In the US, initiatives were launched at both federal and state levels to provide citizens with online services and instant and unlimited access to information (Wilson, 2002).

According to Accenture (2003), Canada plans to provide the federal government's information and services online by 2005 through its Government Online (GOL) initiative.

In Australia, 75% of the people file their taxes electronically (Schoeniger, 2000).

The Italian government established an independent authority named "Authority for Information Technology in the Public Administration" in 1993. The authority was responsible for "promoting, coordinating, planning and controlling the development of information systems within the government central organisations and agencies,

through their standardization, interconnection and integration" (Salza and Mecella, 2001).

Fraser-Moloketi (2003) states that the South African (SA) government is considering setting up a considerable number of self-help e-government service centers in the form of walk-in kiosks in post offices. There are more than 2,500 post offices in South Africa, each serving about 15,000 individuals. Citizens will not have to travel more than 20 km to transact all their business with the government. He believes that the South African government has a strong base from which it can start its e-government readiness, preparedness and delivery.

A study conducted by the United Nations and the American Society for Public Administrations (UN DPEPA and ASPA, 2002), indicates that 88.9% of the 190 United Nations' member states use the Internet in some capacity to deliver information and services to its citizen. Fifty one percent of the countries provide informational web sites, while 30% of the United Nations' members provide interactive Internet services, which enable people to download forms, send emails and request information through the Web. The study also revealed that only 9% of UN member states offer transactional services, which for example enable businesses and citizens to pay their taxes electronically, or renew their drivers' licenses and car registrations online.

Miriam (2001) examined e-government initiatives in the US, Singapore and Australia and concluded that it is still too early to acknowledge the presence of a single e-government model. She noted that in most Government initiatives' the emphasis was on re-engineering work and streamlining processes to be able to provide information to citizens by establishing reliable communication. She also noted that each country has its own unique history and culture and this is reflected in the way the government is structured and functions. The level, degree and intensity of transparency pertaining to information differ from one country to another, and so governments adopt different approaches to the initiation and implementation of e-government initiatives.

## 5.3 MODELS MEASURING READINESS

By "Readiness" is meant having whatever is needed in the way of skills, staff, equipment, plans etc, for a government agency to be able launch an initiative into e-government. The different models offer different lists of requirements and ways of checking to what degree they are present.

### 5.3.1 Capacity Check Model

The e-government Capacity Check model (Canadian Treasury report, 2000) was developed by KPMG (a consulting company) to help senior management assess how ready their organisations are to launch into e-government. The model was designed to integrate six elements which were seen as necessary to implementing e-government; these elements were "e-Strategy, architecture, risk and program management, organisational capabilities and performance management".

By using this model they believed that departments would be in a better position to prioritise their tasks and develop their plans for implementing e-government initiatives.

This study points out that e-strategy is a very important element as it focuses on the organisation's vision towards achieving e-government. The architecture element defines the organisation's readiness in terms of the information technology and secure infrastructure required to host the e-government. The risk and program management element highlights the project management mechanism that would be required to reach the goal of e-government with clear identification of risks and risk mitigation procedures. The organisational capabilities element focuses on the competencies and resources to use and support the tools and techniques that would be used to develop and manage e-government projects. Finally, they adopted performance management measures of how the e-governance initiate has been defined, developed and delivered in terms of the degree of customer or public satisfaction.

### 5.3.2 Gartner's Four Phase e-government model

The Four Phase e-government model was developed by the consultancy group Gartner during the year 2000. According to this model all e-government initiatives progress through four phases, namely "Presence, Interaction, Transaction and Transformation" (Christopher and Andrea, 2000). It is a readiness model and focuses on helping organisations to position e-government initiatives against their specific goals and objects.

The Gartner model defines four phases as follows:

**Phase 1 – Presence:** The Presence phase is characterised by the government organization's intention to make their presence felt on the World Wide Web. Some may have a legitimate need to do this and others would have made the decision simply because certain other organisations had done it.

**Phase 2 – Interaction:** The Interaction phase is characterised by the addition of other interactive facilities on the organisation's web sites besides the simple static information created during phase one. The additional interactive facilities provide basic search capabilities, host forms to download, and give linkages to other relevant sites, as well as email addresses of offices or officials. This stage enables the public to access information online and receives forms, that may have previously required a visit to a government office.

**Phase 3 – Transaction:** The Transaction phase is the goal every government organisation is trying to reach through their e-government initiatives. It is characterised by facilities built into web sites that enable bi-directional interaction between the government and the user by building self-service applications and delivery channels. Typical services that are more to this stage of development include tax filing and payment, driver's license renewal, and payment of fines, permits and licenses. Additionally, many governments put requests for proposals and bidding regulations online as a precursor to e-procurement.

**Phase 4 – Transformation:** The Transformation phase is the ultimate long-term goal characterised by the delivery of relevant services to the user through a single point of entry by seamlessly integrating all the services of various government organisations through a single window. The participating government organisations are transparent to the user. This requires many integration tools and re-engineering of business processes that reshape relationships between citizens, businesses and governments.

The Gartner Four Phases of e-government model provides a reference framework for positioning the progress of e-government initiatives. By mapping each project against the model, a department, agency or government can determine its level of progress, understand which areas must be addressed, and develop a checklist to plan and prioritise policy, organisation and technology interventions required to meet e-government objectives. While the four phases, as described above, form a general progression path, it is not necessary for every part of government to progress to the fourth phase.

### 5.3.3 Europe's Readiness Model

ICL commissioned the consulting firm Kable Limited to conduct a study of Europe's readiness for e-government. "in the hope that its findings will promote and stimulate the European debate on the progress of e-government" (Heath, 2000). He also pointed out that "...automation of the processes and interactions with the public is an essential requirement for a government to become e-government and the process of migration goes through distinct stages, namely: Transmit, Interact, Transact, and Integrate". Heath (2000) described the four stages as follows:

**Stage One – Transmit:** The first stage of Europe's Readiness model is for government organisations to make data available to the public online. Perhaps this requirement was necessary, as it was believed that across Europe most ministries were, for cultural and historic reasons, too conservative to publish information online, even though most of them had adopted the Internet to transmit information. Under such a situation, the e-government initiative would first require a certain amount of

trust and willingness among the ministries to make the data available to the public online.

**Stage Two – Interact**: A two-way online communication between citizen and government is established. Across Europe this incorporates areas such as support for discussions about referenda and interactive policymaking, providing email contact details and discussion groups, and supporting general enquiry / response services.

**Stage Three – Transact**: This stage incorporates transactions such as applications for funding, research contracts, recruitment and procurement.

**Stage Four – Integrate**: This essentially means the completion of a transaction by the citizen interactively through the online systems by accessing the facilities through a single access point and through a common user interface. This means that the citizens can get all the information they need, fulfill all of their obligations and apply for or receive all the services for which they are entitled, from one place.

It can be seen that the Europe Readiness model has much in common with the Gartner model. It incorporates four stages of development, which closely match with the four phases identified by the Gartner model. It is also similar to the Gartner model in that it focuses on identifying appropriate initiatives to align with an agency-specific e-government strategy, rather than specifying an absolute e-government maturity scale.

### 5.3.4 IBM Self-Assessment Model

IBM developed an approach for rapid self-assessment by government organisations of their e-government readiness. It was produced by Moore and Lee (2000) working for IBM Australia. This assessment involves the following steps:

1. Review e-government readiness against a defined set of criteria grouped under a defined set of headings

2. Perform a "gap analysis" between an organisation's current state of readiness and its target state of readiness within a 12 month period

3. Develop and implement an action plan to attain the target readiness state

This approach was intended for self-use by organisations wishing to advance their e-government readiness. It is suitable for those who wish to attain a rapid assessment rather than seeking a more comprehensive and time-consuming approach. Moore *et al*, (2000) argue that "While the assessment provides a qualitative assessment of organisations' e-government readiness, its purpose is to help determine the most appropriate course of action to advance e-government readiness, rather than to provide a basis for cross-agency readiness comparisons. Its value lies in the appropriateness of the course of action it informs rather than in the numerical assessment itself".

## 5.4 BENCHMARKING MODELS

By "Benchmarking" is meant the comparison of the progress of an e-government initiative against other e-government initiatives, or pre-set standards.

### 5.4.1 Cap Gemini Ernst & Young's Model

A report titled "Web-based Survey on Electronic Public Services" was published by Cap Gemini Ernst & Young as part of the eEUROPE programme (Kerschot & Pote 2001). The survey was described as "a benchmarking exercise for evaluating the percentage of public services available online at the time of the survey in the 15 European Union member countries plus Iceland and Norway".

Kerschot *et. al* (2001) state that, "the percentage of basic public services available online was selected as the indicator for the benchmarking. To make that indicator operational, Member States agreed to a common list of 20 basic public services, 12 for citizens and 8 for businesses. Progress in bringing these services online was measured using the now familiar four-stage framework as follows:

Stage 1: Information: Ability to publish information online.
Stage 2: Interaction: Ability to down load information such as filling forms.
Stage 3: Two-way Interaction: Ability to process forms, including authentication
Stage 4: Transaction: Ability to conduct transactions including case handling, decision and delivery and payment.

Kerschot *et. al* also point out that the online availability of public services is determined by the extent to which it possible to provide a service electronically. He suggested that for some public services, the maximum stage they could reach was stage 3, since stage 4 not relevant to them.

The outcome of the survey was a percentage score for the 20 public services for the 17 countries. The percentage indicated the extent to which each service had progressed towards full electronic case handling.

According to Kerschot *et. al* (2001), this benchmarking framework had the following limitations:

1. As the Internet was taken as the basis of supply of service, e-government initiatives which did not use the Internet to supply services were ignored.

2. The survey evaluated only the online accessibility of public services for citizens and businesses. It did not evaluate the redesign of administrative procedures / processes, which is also covered by the term e-government, and is often necessary to improve the online delivery of public services.

3. Some countries were not included in the calculation of the results for some services because those services were not relevant for them.

### 5.4.2 IDA-model

IDA (Interchange of Data between Administrations) is a European Commission driven strategic initiative using advances in information and communications technology to

support rapid electronic exchange of information between European Member States' administrations. The European Community set these objectives to facilitate the operation of the Internal Market and accelerate policy implementation. As part of its brief the IDA initiative commissioned a benchmarking report specifically focused on the identification of e-government services that could be provided at the pan-European level by presenting best practice cases of electronic service delivery with cross-border aspects (Johansson, Aronsson and Andersson 2001).

For the purpose of benchmarking, the following two indicators were defined for e-government:

- Percentage of basic public services available online
- Use of online public services by the public for information purposes or submission of forms

According to Johansson *et al.* (2001), "The IDA survey focused on 13 national public services with *cross-border aspects.* Five were for enterprises: new company registration, corporation tax, VAT, employee social contribution, and statistical report submission. Five were for citizens' "general information or guidance, income tax, employment, social security, and health insurance" and three were specifically for students - general information or guidance, university enrolment, and school quality and results".

This model is similar to the Cap Gemini Ernst and Young model, and consists of four stages defined as follows:

Stage 1 – Information: publish information on line about public services
Stage 2 - Communication/Interaction: one way interaction by downloading of forms and response to forms returned.
Stage 3 - Communication/Two-way interaction: processing of forms (including authentication)

Stage 4 - Transaction: Ability to conduct transactions including case handling, decision, delivery, payment.

According to Johnson *et al* (2001), this approach was tightly focused on identifying areas of best practice in the cross-border aspects of e-government within the e-Europe context. The services that it focused on were assessed from both local and cross-border perspectives.

### 5.4.3 Elsevier Model

This rather different four stages model was based on analysis of the US e-government environment, the four phases being "Cataloguing, Transaction, Vertical Integration and Horizontal Integration" (Layne & Lee, 2001).

Layne and Lee (2000) indicated that the four stages were defined as follows:

**Stage 1 – Cataloguing**: This first stage is called cataloguing because efforts are focused on cataloguing government information and presenting it on its official web sites. Examples of functionalities at this stage are mostly limited to on-line presentations of Government information and on-line-forms initiatives.

**Stage 2 – Transaction**: In the second stage, e-government initiatives focus on connecting the internal government system to on-line interfaces, and allowing citizens to perform transactions with government electronically. For example citizens may renew their licenses and pay fines on-line.

**Stage 3 - Vertical Integration**: The third stage refers to the process of inter-connecting different functions or services of the local, state and federal Governments, enabling one organisation to obtain required information from the system of another organisation. As an example of vertical integration, a state drivers' license registration system at a state might be linked to a national database of licensed truckers for cross-checking. Another example would be business licence processing.

**Stage 4 - Horizontal Integration**: The fourth stage refers to the process of not only inter-connection but also seamless integration across the functions and services of the

local, state and federal governments and delivery to the citizens through a single user interface and a single transaction. An example would be a business being able to pay its unemployment insurance to one state agency and its state business taxes to another state agency at the same time, because systems in both agencies talk to each other or work from the same database.

Readiness mechanics and progress assessment were not discussed in this model, but Layne *et al,* (2000) believe that by setting out this model they have established a template against which agencies can check their progress and development for e-government.

### 5.4.4 The Accenture Model

This model was developed by the consulting company ACCENTURE, and used in a study conducted during January 2001 to determine the status of e-government spanning 22 countries (Accenture-eGov, 2001).

In this model a government organisation acts as a services provider and citizens as services consumers. The model sets out to measure service maturity. The maturity of service was categorised through three parameters namely, publish, interact and transact. "Transact" reflected the highest level at which a particular service could be offered and "Publish" the lowest level.

Four parameters were defined to measure the levels of service maturity, namely "Very Low", "Low", "Marginal" and "Moderate". The level of service maturity was based on how close a government organisation's service matched the Publish level of service (very low) or how close it was to the Transact level of service (moderate).

Delivery maturity basically focused on the sophistication of the user interface used to deliver services through online mechanisms such as single point of entry, design by customer intentions, customer relationship management techniques, portal capability and additional value-added services".

## 5.5 MATURITY FRAMEWORK MODELS

### 5.5.1 Carnegie Mellon Software Maturity Framework Model

The Carnegie Mellon software process maturity framework was originally developed to define and measure the degree of maturity of a complex software development process and to assist organisations in improving their software processes. (Paulk, Curtis and Chrissis, 1991).

"It has proved to be an extremely powerful planning aid when applied to other complex development processes, both as a benchmarking tool and also for the planning and development of new management systems, especially those that require time and experience to develop" (Weber, Paulk, Wise & Withey, 1991).

Paulk *et al.* (1991) reported that the Carnegie-Mellon Maturity Framework has five levels, described as *Initial*, *Recognising*, *Defined*, *Managed*, and *Optimising*.

They commented that the important feature of this Framework is the recognition that each level of development must be attained and established fairly completely before starting on progress towards the next one, and that the tasks to be done between levels vary.

It is important to realise that the term "Maturity" refers not just to the services implemented, but to the management systems used to develop these services.

The first two levels (Initial and Recognising stage) of the framework are characteristic of organisations that have recognised the need for a more advanced management system but have yet to fully develop or deploy it. The middle level (Defined) reflects the situation of an organisation that has defined the necessary management controls and standards but has yet to develop the necessary management skills and experience. At the "Managed" level organisations are actively employing a management system and are beginning to harness the benefits. At the highest, (Optimising) level, an

organisation has acquired the ability to continuously improve its software development process.

### 5.5.2 Shell Information Security Maturity Framework

The Royal Dutch/Shell Group selected the Carnegie Mellon Process Maturity Framework as the basis for their management of IT, especially in the area of information security (Lacey D[1] 1996). The original Carnegie Mellon model for software development was significantly adapted to fit the characteristics of information security, and the requirements of the implementation programme.

According to Lacey (1996), the Shell experience indicates that the maturity framework concept can be successfully exploited as the basis for a long-range programme for developing and improving the management systems of an organisation.

Three separate management tools were developed as part of this framework:

- Five Level Information Security Maturity Framework
- Health Check Questionnaire
- Performance Measurement Framework.

These tools are described as follows:

***Five Levels of Information Security Maturity Framework***

According to Lacey (2000), the Shell Information Security Maturity Framework Model consists of five levels of process maturity, together with clear, identifiable

[1] The content of this section was provided during an interview in July 1999 with David Lacey former head of information Security in Shell UK and the author of the Information Security Maturity Framework, (David.lacey@consignia.com.cvf).

themes for each, designed to take the organisation to the next highest level. The five levels are described as follow:

**Initial level** - The first level is characterised by the senior management's awareness of the need to address information security, and commitment to its management. At the initial stage there is likely to be a considerable degree of uncertainty about the full extent of the gap between the requirements and the security controls in place within the company.

**Recognising level** – This next level of maturity is characterised by an increasing level of understanding by the management of the organisation's level of compliance with their security standard.

**Specifying level** – At this level activities will include the establishment of policies and responsibilities, documentation of procedures, and the development of initiatives to educate and motivate company staff. This level of maturity is characterised by a steep improvement in awareness across the organisation, as security becomes recognised as a serious company issue.

**Managing level** - At this level, the presence of a formal information security management system ensures that security requirements are addressed at all levels across the organisation, and it enables longer-term progress in achieving closer alignment with their set security standard.

**Optimising level** - The highest level of maturity in the Shell Information Security Maturity Framework is characterised by the evolution and adoption of best practices in information security, and continuous reviews and improvements in performance.

***Health check questionnaire***

A "Health Check" questionnaire was used throughout the five levels of the maturity framework to measure the organisation's compliance with their defined security indicators and to provide initial guidance on targets and priorities.

***Performance measurement framework***

The Performance Measurement Framework was applied as a means of assessing compliance with the defined success factors to help their organisation measure and improve their security performance at the higher levels of maturity.

Lacey (1999) pointed out that to carry out the exercise of defining and implementing an information security maturity framework in their organisation, would require having a number of guiding principles. The first is that the measurements should be based upon open, frank discussion and exploration of the critical success factors. The second is that the exercise should be undertaken with the active participation of the management, business and IT staff who are directly involved in, or affected by, the security activities being measured.

### 5.5.3 ASSURE Information Maturity Framework

In the year 2000, The Post Office Group in the UK established a central Group Information Management function to coordinate its generation and exploitation of shared information in support of its new, restructured organisation and its major Enterprise Resource Management (ERM) and Customer Relationship Management (CRM) programmes (David Lacey[2], 2000). The key objective of the function was to ensure "The right information to the right people at the right time."

According to Lacey (2000) "The Group Information Management function required a management model to assess, develop and review the use of information across the enterprise. The solution was the development of a maturity framework called ASSURES, which comprised a set of change management tools for managers at all levels, designed to measure information management performance against objective

[2] The content of this section was provided during an interview on July 2000 with David Lacey current Head of Information Security Post office, UK (David.lacey@consignia.com.cvf)

criteria, identify and specify targets for change management, and relate change management targets to strategic information management goals".

He added that "The complete ASSURE information maturity model consists of a set of practical management tools and documents, including:

- Information-related key performance indicators, including those specifically aimed at the information management function.
- Sets of enabling criteria that further define the scope of each key performance indicator.
- Key performance indicators defining four levels of maturity: Individualistic, Demarcated, Co-operative and Interdependent.
- Key performance indicators set out in five matrices covering: maturity in the application of information processes, methods, capabilities, business focus and content.
- An information maturity audit, scoring and reporting process.
- Auditor training and support materials to capture and promulgate best practice".

The general structure of the information maturity measurement system drew on a wide variety of similar maturity models, including the original Carnegie Mellon Process Maturity framework, but it was specifically designed and tailored to fit the specific needs of the UK Post Office.

## 5.6 DISCUSSION

Based on this review, it is noted that the concept of "e-government maturity" has not yet received a widespread degree of attention. The focus is still much more on concepts such as "e-government readiness" and "e-government benchmarking". The latter has been used to describe a diverse range of approaches, which attempt to compare the e-government initiatives of different government organisations.

It is also noted that readiness assessments tend to focus on issues such as strategic visioning capabilities, organisational preparedness, technological advancement, and ability to manage change. A maturity approach to e-government could involve a similar set of evaluation criteria.

The notable difference is that the readiness assessment approach focuses on identifying initiatives that should be executed to *initiate* an e-government programme while a maturity assessment approach focuses on identifying initiatives and management systems required to continue advancing initiatives and systems to reach higher levels of maturity. A maturity framework applies equally to an e-government programme that has already been established for a period of time, as to one that has just started.

One major shortcoming in the majority of the models is not considering human factors sufficiently. These models gave most consideration to technology and organisational structure. In the opinion of the researcher, it makes a lot of sense for any maturity framework for e-government, to give equal weight to the elements of people, organisation and technology.

In the next chapter a new framework for e-government is proposed. This is called the POTIRDMO Maturity framework, for reasons that will be explained. The POTIRDMO model is an adaptation of the Carnegie Mellon Process Maturity Framework, and was inspired by its successful adaptation by Royal Dutch/Shell Group for their information security maturity framework.

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# CHAPTER 6

# THE POTIRDMO FRAMEWORK FOR E-GOVERNMENT

## 6.1 INTRODUCTION

A major aim of this work is to fill a research gap in the area of maturity frameworks for e-government. Eleven models were reviewed in chapter 5. In this chapter a more advanced maturity framework is proposed and developed. The proposed structure for the new maturity framework was derived from the above literature research, enhanced with the findings from the case studies and research interviews reported in earlier chapters. This chapter describes the setting up of the structure of the new maturity framework, and how its details were filled in by further research. This research consisted of interviews and questionnaires directed at professional people involved in e-government projects.

## 6.2 THE BASIS

The starting point of this chapter is to adapt the Carnegie Mellon maturity framework for software development to the subject area of e-government. As described in the previous chapter, a similar approach was adopted by the Royal Dutch/Shell group, in translating the characteristics and achievement levels of the original Carnegie Mellon framework into characteristics and factors for the areas of developing information management and information security processes.

The additional challenge for e-government in the Sultanate of Oman is that a lack of maturity exists, not only within the organisations that will develop and operate the new systems and processes, but also in the technological infrastructure that will deliver the new services and in the general population that will utilise them. This complicates the task of developing a maturity framework, because it has to attend to

developing maturity for the organisations, the technological infrastructure and the end-users; that is, the people.

It is therefore proposed here that the maturity framework for e-government must be able to define and measure the maturity levels of three key dimensions: People, Organisation and Technology. We will call this the POT aspect. We have seen that developing e-government will bring about change, and that Stoner and Freeman (1992) in the previous chapter, argued that when introducing change into organisations, it is important to consider these three areas.

Almost all the maturity framework that were discussed in the previous chapter concentrated on only one or two of these the POT aspects, mostly Technology and Organisation. In spite of the importance of these, the third aspect, People, should also be considered as essential. This is particularly the case in Oman, where both people and organisations are developing rapidly.

## 6.3 DEVELOPING THE NEW MATURITY FRAMEWORK FOR E-GOVERNMENT

The new framework will be developed through the following steps:

1. Define the basic structure of the framework.
2. Define in general terms the contents that are to go in each cell of the framework.
3. Conduct research to identify the required contents in detail, for each cell.
4. Populate the findings into the empty cells of the framework.

### 6.3.1 Initial decision on the structure of the POTIRDMO maturity framework

The researcher felt that the same five stages described in the Carnegie Mellon process maturity framework would be appropriate for the framework to be constructed for e-government, with the same definitions of each stage. These stages had been successfully applied by Royal Dutch/Shell to their range of subject areas in IT management. According to Lacey (1996), the originator of the information security framework for shell, "this framework appears to represent the optimum number of stages for both planning and benchmarking purposes"

The five Stages: *Initial, Recognising, Defined, Managed and Optimising*, can for convenience be abbreviated as IRDMO.

The addition of the POT aspect to the five IRDMO stages, gives rise to the abbreviation POTIRDMO[1] as an acronym for the proposed model. The basic structure is shown in Table 6.1.

**Table 6.1** The Basic structure of the POTIRDMO framework for development of e-government.

| Maturity stage | People | Organisation | Technology |
|---|---|---|---|
| Initial | | | |
| Recognising | | | |
| Defined | | | |
| Managed | | | |
| Optimising | | | |

[1] POTIRDMO is an acronym only

### 6.3.2 Defining the contents of each cell

Following Shell's adaptation of the Carnegie Mellon approach, it is proposed that in each cell of the table we enter:

(a) The characteristics that define each stage, and enable recognition that the project is in this particular stage.

(b) The tasks that should be undertaken during that stage in order to get ready to progress to the next one

(c) The measures by which we measure completion of a stage and readiness to progress to the next stage. At stage 1, 2, 3 and 4 the measures are of completeness of the stage, at stage 5 measures are for continuation and maintenance at this level).

We now enter the headings Characteristics, Tasks and Measures[2] as three rows in each cell. It might be convenient to refer to this as the CTM aspect. The generic POTIRDMO framework is presented in Table 6.2, overleaf. It is generic because the same headings have been entered into each cell.

The next stage will be to populate each cell by finding out what in detail are the Characteristics, Tasks and Measures which apply in it.

It should be pointed out here that it is neither necessary nor likely that all three POT aspects should achieve an equivalent level of maturity at the same time.

[2] Shell had an equivalent set of three types of cell contents, but used different terminology.

**Table 6.2** The generic POTIRDMO Framework. This is the same as Table 6.1, but with each cell populated with generic contents, to be identified specifically by the research.

| Maturity Level | PEOPLE | ORGANISATION | TECHNOLOGY |
|---|---|---|---|
| **Initial Stage** | Characteristics<br>Tasks<br>Measures | Characteristics<br>Tasks<br>Measures | Characteristics<br>Tasks<br>Measures |
| **Recognising Stage** | Characteristics<br>Tasks<br>Measures | Characteristics<br>Tasks<br>Measures | Characteristics<br>Tasks<br>Measures |
| **Defined Stage** | Characteristics<br>Tasks<br>Measures | Characteristics<br>Tasks<br>Measures | Characteristics<br>Tasks<br>Measures |
| **Managed Stage** | Characteristics<br>Tasks<br>Measures | Characteristics<br>Tasks<br>Measures | Characteristics<br>Tasks<br>Measures |
| **Optimising Stage** | Characteristics<br>Tasks<br>Measures | Characteristics<br>Tasks<br>Measures | Characteristics<br>Tasks<br>Measures |

### 6.3.3 Research to identify CTM components for the three POT aspects in each cell in the POTIRDMO framework.

For each cell in the table we expect different defining Characteristics, different Tasks and different Measures. For each of these we will expect at least one and probably more *Factors*. For example there might be several management topics relevant to the People aspect of the Initial stage, and we will call each of these a "Factor". To identify the factors, research was carried out which consisted of interviews that were conducted with people involved in e-government projects in Oman.

The table has 15 cells, and there are the three CTM aspects in each cell, so by the end of this chapter there will be 45 sets of empirically derived factors describing all the elements of the fully populated POTIRDMO Maturity Framework for e-government.

### 6.3.4 Semi-structured interviews

A survey was carried out in Oman between January and March 2002 using the semi-structured interview technique. The technique of semi-structured interviewing has been described in chapter 1, and applied in chapters 2, 3 and 4.

The respondents were selected from different spheres of involvement. Twenty four people involved in e-government initiatives in Oman, and others who were experienced in the management of IT, were interviewed for an average of 75 to 90 minutes each. The participants consisted of 8 member of the IT Task Force who were involved with the e-government strategy in Oman, 2 senior consultants from the Gartner Group who were involved in developing an e-government strategy for Oman, 2 senior members of the Oman Information Technology Council, 4 academics from Sultan Qaboos University, 2 consultants from IBM Oman, 2 consultants from Ernst and Young Consulting company and 4 ICT managers in Government ministries.

The interview agenda included a generic POTIRDMO framework and the participants were briefed about this model and how it is intended to work, before their interviews. Questions were asked related to the three different CTM aspects of each of the three

POT aspects. Interviewees considered one cell of the table at a time, so it was clear to which cells the factors found in their statements referred. Open ended questions were also asked in an attempt to capture views and issues not included in the agenda.

The interviews were conducted in Arabic for Arabic speakers and in English for English speakers. All were tape-recorded to facilitate content analysis. The translated interview questions from Arabic to English are given in Appendix 6.1.

The contents of the interviews were analysed. Names for the Factors that were uncovered during the content analysis were composed by the researcher. Three examples of how these Factors were derived are presented below and further examples are provided in appendix 6.2.

**Examples of deriving Factors from the interview transcripts**

***Example A***

This concerns identifying a Factor belonging to the Characteristics of the People aspect in the Initial stage. Six quotes, which appeared to refer to the same Factor, were grouped together as shown.

Interviewee 1: "*Majority of people in Oman have little knowledge of IT*".

Interviewee 2: "*At this stage people's education in IT is very basic*".

Interviewee 5: "*At this stage IT skills in general are very basic*".

Interviewee 10: "*At this stage, diffusion of IT to people is very limited*".

Interviewee 12:"*At this stage, public usage of IT is very limited due to their skills*".

Interviewee 20: "*At this stage, the e-government knowledge is pre-mature*".

The researcher decided to name this Factor "Low Level of IT education and Skills". A longer description of this Factor was also composed, using the above quotations and

general knowledge of the subject area gained from all the previous research. The Factor and its description are presented in table 6.3

**Table 6.3** A people /characteristic Factor and its location in POTIRDMO framework.

| Location | Factor | Description of this factor |
|---|---|---|
| The Initial Stage<br><br>People/Characteristic | Low level of IT education and skills | The majorities of citizens have little or no experience of information technology and do not appreciate the potential and benefits of electronic government services. |

***Example B***

This concerns identifying a Factor belonging to the Tasks aspect of the People the Initial stage. The same procedure was followed as in the first example.

Interviewee 1: "*At this stage, we need to educate our people*".

Interviewee 4: "*At this stage, education must be a priority*".

Interviewee 8: *"At this stage, we should introduce IT driving license similar to European Union"*.

Interviewee 14: *"At this stage, people must be encouraged to learn about IT and electronic services"*.

Interviewee 12: *"At this stage, the Ministry of Education should introduce IT as a subject in the schools"*.

Interviewee 16: *"At this stage, extensive awareness and education of electronic services should be initiated"*.

The Factor Name and Description composed are shown in table 6.4.

**Table 6.4** A Peoples/Task Factor and its location in POTIRDMO framework.

| Location | Factor | Description |
|---|---|---|
| The Initial Stage People /Tasks | Educating the people | Educating the people in the use of information technology. |

***Example C***

This concerns identifying a Factor belonging to the Measures of the People aspect of the Initial stage.

Interviewee 2: *"To move to the second stage, the media must act pro-actively"*.
Interviewee 5: *"To move to the second stage, we need to get media support to people"*.

Interviewee 12: *"To move to the second stage, media support is required similar to Y2K project"*.

Interviewee 16: *"To move to the second stage, media and publicity must be in place"*.

Interviewee 18: *"To move to the second stage, the Ministry of Education and the Ministry of Information should have a good media campaign in place"*.

Interviewee 17: *"To move to the second stage, lessons from Y2K for media publicity must be taken into consideration"*.

**Table 6.5** The People/ Measure Factor in its location in POTIRDMO framework

| Location | Factor | Description |
|---|---|---|
| The Initial Stage People/ Measure | Media and opinion former support | Support of the media and other major sources of influence on public opinion |

### 6.3.5 Reliability checks on the content analysis

A similar approach as was explained in previous chapters to check for reliability was followed. To ensure that all Factors relatively to POT were considered, and to check for the presence of personal bias in the data analysis, a second rater was asked to review the tapes of five of the interviews. The rater was an Arabic speaker, working in one of the e-government consulting firms in Oman, who had previous academic experience in the United Kingdom.

Five tapes were selected randomly. The list of factors uncovered by the researcher by means of content analysis was compared with the second rater's findings as shown in Tables 6.6, 6.7 and 6.8 respectively. The comparison was based on the concepts of the Factors rather than their precise names.

**Table 6.6** Number of Factors relative to Characteristics, identified by the researcher and by the rater from the 5 randomly selected tapes. Factors for all five stages and three POT aspects are combined here.

| Tape | Researcher Findings | Rater Findings | New Factors |
|---|---|---|---|
| 1 | 25 | 23 | 0 |
| 2 | 29 | 29 | 0 |
| 3 | 19 | 20 | 1 |
| 4 | 31 | 28 | 0 |
| 5 | 33 | 30 | 0 |

**Table 6.7** Number of Factors relating to Tasks identified by the researcher and the rater from the 5 randomly selected tapes.

| Tape | Researcher Findings | Rater Findings | New Factors |
|---|---|---|---|
| 1 | 15 | 12 | 0 |
| 2 | 12 | 12 | 0 |
| 3 | 15 | 14 | 0 |
| 4 | 15 | 11 | 0 |
| 5 | 14 | 11 | 0 |

**Table 6.8** Number of Factors relating to Measures identified by the researcher and the rater from the 5 randomly selected tapes.

| Tape | Researcher Findings | Rater Findings | New Factors |
|---|---|---|---|
| 1 | 22 | 23 | 1 |
| 2 | 25 | 23 | 0 |
| 3 | 24 | 20 | 0 |
| 4 | 23 | 19 | 0 |
| 5 | 24 | 18 | 0 |

In Table 6.6, the researcher found a total of 33 factors in these five interviews, while the rater found 30 Factors. Thus, the rater did not discover any new Factors. On tape 3 the researcher found 19 Factors while the rater found 20, which means that the rater found one more Factor, which was "*Increased usage of new service*". However this factor had been identified by the researcher on another tape, so in actual fact the rater did not find any new Factors.

In Table 6.7 the researcher found 15 Factors, and the rater found 14 out of 15 factors found by researcher. No new Factor was found.

In Table 6.8, the rater Found one new Factor, "*identification of pilots*". Again this Factor had already been identified by the researcher on other tapes, so that no new Factor was in fact found.

***Further reliability test – expert consultation***

The 80 Factors were presented to a senior Information Technology (IT) consultant from the Gartner consulting company, a senior consultant from IBM Middle East, a professor from the University of South Africa and a senior expert on e-business in the United Kingdom. The process was based on one discussion with each of the outcome of the POTIRDMO model. No new Factors were identified.

The content analysis applied in this research was therefore considered to have produced reliable results.

***Completeness of the factor list***

It is worthwhile noting that in Table 6.6, an average of 27 Characteristics Factors was found by the researcher in each tape, which is about 70% of the total of 39 Characteristics Factors found from all the tapes. If one interview found 70% of Factors, it is highly likely that 24 interviews were amply sufficient to find all the Factors.

A similar comment argument applies to Tables 6.7 and 6.8 for Tasks Factors and Measures factors.

### 6.3.6 Findings from the interviews

As a result of this analysis, a total of 80 Factors were derived empirically from the 24 interviews. Thirty nine of these Factors described Characteristics. In the POT dimension, 13 of these referred to People, 14 to Organisation and 12 to Technology.

15 of the 80 Factors applied to Key Tasks, 5 referred to People, 5 to Organisation, and 5 to technology.

26 Factors applied to Completion Measures, 8 referring to People, 9 to Organisation and 9 to Technology.

In Tables 6.9, 6.10 and 6.11 are shown the numbers of these Factors which are allocated to each of the Stages and POT aspects, for the three CTM aspects.

**Table 6.9** Numbers of *Stage Characteristics* Factors in each of the IRDMO stages, divided into their PTO aspects.

| **Maturity Stages** | People | Organisation | Technology | Total |
|---|---|---|---|---|
| Initial Stage | 2 | 2 | 2 | 6 |
| Recognising Stage | 2 | 3 | 2 | 7 |
| Defined Stage | 3 | 3 | 2 | 8 |
| Managed Stage | 3 | 3 | 3 | 9 |
| Optimising Stage | 3 | 3 | 3 | 9 |
| **Total** | **13** | **14** | **12** | **39** |

**Table 6.10** Numbers of *Tasks* Factors in each of the IRDMO stages, divided into their PTO aspects.

| **Maturity Stages** | People | Organisation | Technology | Total |
|---|---|---|---|---|
| Initial Stage | 1 | 1 | 1 | 3 |
| Recognising Stage | 1 | 1 | 1 | 3 |
| Defined Stage | 1 | 1 | 1 | 3 |
| Managed Stage | 1 | 1 | 1 | 3 |
| Optimising Stage | 1 | 1 | 1 | 3 |
| **Total** | **5** | **5** | **5** | **15** |

**Table 6.11** Numbers of *Completion Measures* Factors in each of the IRDMO stages, divided into their PTO aspects.

| **Maturity Stages** | People | Organisation | Technology | Total |
|---|---|---|---|---|
| Initial Stage | 1 | 2 | 2 | 5 |
| Recognising Stage | 2 | 2 | 2 | 6 |
| Defined Stage | 2 | 2 | 2 | 6 |
| Managed Stage | 2 | 2 | 2 | 6 |
| Optimising Stage | 1 | 1 | 1 | 3 |
| **Total** | **8** | **9** | **9** | **26** |

### 6.3.7 The factor list

The 80 factors are now listed, showing their names and descriptions. This provides a reference table to be used in conjunction with the POTIRDMO framework which follows. Firstly Factors belonging to Characteristic aspects of all stages and POT aspects are listed, then those for Tasks, and finally those for Measures. In a few cases no description is given, because the name is self-explanatory.

**Table 6.12** List of the 80 factors with their descriptions.

| No | Factors relevant to Characteristics | Description |
|---|---|---|
| | **Initial stage** | |
| 1 | Low level of IT education and skills | The majority of citizens have little or no experience of information technology and do not appreciate the potential and benefits of electronic government services. |
| 2 | Few telephones or bank accounts | Large percentage of population without telephone or bank account |
| 3 | Citizen contacts with government not coordinated | Co-ordination between citizen and government Ministries is non-existent electronically |
| 4 | No strategy | No national body for e-government to develop strategy & standards |
| 5 | No multi-channel strategy | Strategy to provide different electronic access not available. |

| | | |
|---|---|---|
| 6 | Little use of electronic channels | Electronic channels between government and citizens is limited |
| | **Recognising stage** | |
| 7 | Citizen surveys initiated | Survey to establish the potential for the citizen to use the e-government is started |
| 8 | Campaigns to raise awareness | Campaigns launched to raise awareness of IT and e-government matters among the citizens |
| 9 | Benefits identified | Benefit of implementing e-government identified |
| 10 | Project teams formed | Different project teams formed within the government to assist new e-government projects |
| 11 | Strategy under development | The national strategy for e-government is under development |
| 12 | New technologies studied | A more extensive studies and technical infrastructure is beginning to emerge |
| 13 | Gap analysis initiated | Analysis of what is available and what technologies can be anticipated in the near future. |
| | **Define stage** | |
| 12 | Pilots launched | Government initiates pilot projects to capture lessons in early stages |
| 15 | Smart card strategy defined | The strategy for the Citizen to use smart cards within e-government services is defined |
| 16 | Citizen education programme Initiated | Education programme to enhance the citizen's knowledge and usage of IT and e-government services |

| | | |
|---|---|---|
| | | is initiated |
| 17 | Central unit in place | Authoritative body to run e-government initiative in place |
| 18 | Strategy and targets established | New strategy for e-government and road map plan with target dates established |
| 19 | Business case developed | The business case for implementing e-government is developed, costed and understood. |
| 20 | Multi-channel strategy established | A strategy is in place for further developing electronic channels between Government and citizens. |
| 21 | Standards and security for new technologies established | Adopters of e-government services are starting to establish standards and security for adopting new technology |
| | **Manage stage** | |
| 22 | Kiosks in public places | Kiosks are available in public to provide access to e-government services |
| 23 | Smart cards in use to access services | Multi-purpose smart cards in place, which citizen use to access Government services |
| 24 | Help lines established | Help facilities and call centres in place, to answer questions about the services and help citizens with the IT aspect of the services |
| 25 | Joined-up services started | Ministries are beginning to link their services electronically and share data bases. |

| | | |
|---|---|---|
| 26 | Operational support organisation | Organisation to support day to day operation of joined up services in place |
| 27 | Basic registration authority | A simple central co-ordinating unit is in place to manage the electronic identification and authentication of citizens. |
| 28 | Electronic channels established | Different methods of access to government services established |
| 29 | Service levels meet standards | Service level agreements have improved to meet the operational standards |
| 30 | Basic security services available | Basic security services are available to support the e-government. |
| | **Optimising stage** | |
| 31 | Comprehensive range of public outlets available | |
| 32 | Increasing usage of new services | Increase usage by the public of services provided through e-government channels |
| 33 | Increasing citizen satisfaction with services | Citizens fully satisfied with the services provided by e-government channels |
| 34 | Targets met and benefits being realised | Initial targets set for implementing the strategy are met and people start to see the benefits. |
| 35 | Sophisticated registration & certification of users | Central registration authority to manage the electronic identification authentication of citizens and the management of access rights to e-government services. |

| | | |
|---|---|---|
| 36 | Improvements identified | Improvement of services is identified and new target dates are set. |
| 37 | Widely used multi-channel coverage | Comprehensive, secure, multiple-channel e-government services are available and regularly used by the vast majority of citizens. |
| 38 | Design has become citizen centric | In designing of any new service, citizen issues and requirements will be considered first |
| 39 | Advanced security features | Advanced security features (strong encryption) are used in many services to safeguard the privacy and integrity of citizens' transactions. |
| | **Factors relevant to Stage Tasks** | |
| | **Initial Stage** | |
| 40 | IT education | Education of the people in the use of information technology. |
| 41 | Benefits understood | Benefits and implications associated with the development of e-government services are understood by the government and officials. |
| 42 | Visioning the future | Visioning the future of the emerging information technologies and how they may transform government services to citizen. |
| | **Recognising stage** | |
| 43 | Promotion of the information society | Encouraging the people to become part of the national and global information society. Educating citizens, about the benefits of the information age and how it |

| | | |
|---|---|---|
| | | will impact on day-to-day business. |
| 44 | Teamwork across boundaries | Greater co-operation and teamwork across organisational boundaries, especially across ministries but also between government, industry and academia. |
| 45 | Introduction of electronic channels | Introducing electronic channels between government ministries and citizens. |
| | **Define stage** | |
| 46 | Information society proof of concept | Proving the concept of the information society by demonstrating the cost and benefit of e-government to citizens and industry |
| 47 | Breaking down barriers to joined-up Government. | Refining or restructuring the political framework to ensure stronger central co-ordination of government information systems development. |
| 48 | New infrastructure rollout | Rolling out the new electronic infrastructure, such as high bandwidth network |
| | **Manage stage** | |
| 49 | Building trust of citizens | Demonstrating the security, integrity and reliability of e-government transactions to get trust of citizen. |
| 50 | Business process re-engineering | Restructuring the existing information systems and business processes of ministries to achieve breakthrough improvements in efficiency and effectiveness. |

| | | |
|---|---|---|
| 51 | Managing multiple channels | Managing multiple channels between government and citizens. |
| | **Optimising stage** | |
| 52 | Citizen-centric services | Building citizen-centric services by refining interfaces with existing information systems to achieve more friendly and efficient interaction with citizens |
| 53 | Maximising the benefits. | Measuring the gap between potential and actual benefits achieved; Identifying and removing barriers to harnessing the benefit of e-government |
| 54 | Implementing information security. | Delivering sophisticated authentication and encryption services to ensure the confidentiality, integrity and non-repudiation of e-government transactions. |
| | **Factors relevant to Stage Measures** | |
| | **Initial Stage** | |
| 55 | Media and opinion formers support | Support of the media and other major sources of influence on public opinion |
| 56 | e-government champion | Existence of a motivated champion to promote e-government |
| 57 | High-level political support | Gaining support from cabinet, Ministries, other Government Organisations |
| 58 | Adopting a strong technical vision | Adoption of a strong technical vision by the government |
| 59 | Understanding new | Understanding the potential benefits and impact of |

| | | |
|---|---|---|
| | technologies | emerging technologies |
| | **Recognising Stage** | |
| 60 | Citizens Support | Support of citizens and their willingness to access e-government services. |
| 61 | Identification of pilots | Identification of suitable pilot applications with a high probability of success |
| 62 | Compelling business case | An economically persuasive case for more spending on e-government is now apparent |
| 63 | Co-operation of Ministries | Ministries are cooperating with each other and with IT departments and suppliers, in the development of e-government |
| 64 | Investment in new infrastructure | Investment of new technological infrastructure to support e-government services in new infrastructure |
| 65 | Planning and forecasting skills established | Good planning and technology forecasting skills available. Investment appraisal capability for new technology. |
| | **Define stage** | |
| 66 | Successful pilots | Pilot applications successfully completed |
| 67 | Growing use by citizens | More electronic services are being used by citizens |
| 68 | Strong Governance | Strong governance to run e-government services |
| 69 | Project management skills | Good project management skills to be able to run complex project for e-government |

| | | |
|---|---|---|
| 70 | Reliable electronic infrastructure | Reliable, high performance national electronic infrastructure |
| 71 | End to End service | Services operate transparently from the citizen to the appropriate official across multiple technologies and systems |
| | **Manage stage** | |
| 72 | Significant level of use by citizens | Increased number of citizen using service provide by the Ministries electronically. |
| 73 | Citizens trust new services | Citizens trust the new services for their day-to-day business |
| 74 | Ability to recover and learn from mistakes | |
| 75 | Business led | Projects are driven by business needs, not by IT possibilities |
| 76 | Cost effective Infrastructure | Infrastructure established to deliver e-government services must be cost effective for both the government cost citizens |
| 77 | Information security expertise | Building strong expertise in information security |
| | **Optimising stage** | |
| 78 | Responsive public service | High interaction between public and government ministries through e-government services. |
| 79 | Good financial management | Sophisticated financial management in place to measure and continuously modify the services |

| | | |
|---|---|---|
| | | delivered by ministries through e-government. |
| 80 | Quality service and security management in place | Technology infrastructure provides high quality of service with trusted high security maintained at optimum stage. |

## 6.4 COMPLETING THE POTIRDMO FRAMEWORK

### 6.4.1 Populating the Factors into the POTIRDMO framework

The next step was to enter the 80 factors into the appropriate cells of the POTIRDMO model. In the interviews, Factors for Characteristics, Tasks and Measures, for each of the People, Organisation and Technology aspects, for each of the five levels Initial, Recognitions, Define, Manage and Optimising, had been considered separately. Therefore where a Factor belonged in was predetermined. Table 6.13 overleaf shows the completed Framework.

**Table 6.13** The complete POTIRDMO Framework for e-government.

| | People | Organisation | Technology |
|---|---|---|---|
| **The Initial Stage** | | | |
| **Characteristics** | Low level of IT education and skills<br><br>Few telephones or bank accounts | Citizen contacts with government not co-ordinated<br><br>No strategy | No multi-channel strategy<br><br>Little use of electronic channels |
| **Tasks** | IT Educating | Benefits Understood | Vision the future |
| **Measures** | Media and opinion formers support | e-government champion<br><br>High-level political support | Adopting a strong technical vision<br><br>Understanding new technologies |
| **The Recognising Stage** | | | |
| **Characteristics** | Citizen surveys initiated<br><br>Campaigns to raise awareness | Benefits identified<br><br>Project team formed<br><br>Strategy under development | new technologies studied<br><br>Gap analysis initiated |
| **Tasks** | Promotion of the information society | Teamwork across boundaries | Introducing electronic channels |

| | | | |
|---|---|---|---|
| **Measures** | Citizens support<br><br>Identification of pilots | Compelling business case<br><br>Co-operation of Ministries | Investment in new infrastructure<br><br>Planning and forecasting skills established |
| **The Defined Stage** | | | |
| **Characteristics** | Pilots launched<br><br>Citizen smart card strategy defined<br><br>Citizen education programme Initiated | Central unit in place<br><br>Strategy and targets established<br><br>Business case understood | Multi-channel strategy established<br><br>Standard and security for technologies established |
| **Tasks** | Information society proof of concept | Breaking down barriers to joined-up Government | New infrastructure rollout |
| **Measures** | Successful pilots<br><br>Growing use by citizens | Strong governance<br><br>Project management skills | Reliable electronic infrastructure<br><br>End-to-end service |
| **The Managed Stage** | | | |
| **Characteristics** | Kiosks in public places | Joined-up services started | Electronic channels established |

| | | | |
|---|---|---|---|
| | Smart cards in use to access services<br><br>Help lines established | Operational support organisation<br><br>Basic registration authority | Service levels meet standards<br><br>Basic security services available |
| **Tasks** | Building the trust of citizens | Business process re-engineering | Managing multiple channels |
| **Measures** | Significant level of use by citizens<br><br>Citizens trust the new services | Ability to recover and learn from mistakes<br><br>Business lead | Cost effective infrastructure<br><br>Information security expertise |
| **Optimising Stage** | | | |
| **Characteristics** | Comprehensive range of public outlets available<br><br>Increasing usage of new services<br><br>Increasing citizen satisfaction with services | Targets met and benefits realised<br><br>Sophisticated registration and certification of users<br><br>Improvements identified | Widely used of multi-channel coverage<br><br>Design has becoming citizen centric<br><br>Advanced security features |
| **Tasks** | Citizen-centric services | Maximising the benefits | Implementation of Information security |
| **Measure to maintaining this level** | Responsive public services | Good financial management | Quality and security management |

## 6.5 DISCUSSION - HOW THE POTIRDMO FRAMEWORK OPERATES

By applying the completed POTIRDMO framework we can describe the way in which e-government will develop.

The starting point is the Initial stage, a situation where no prior e-government initiatives have been launched and there are no electronic government-to-citizen services. Ministries and citizens have no experience of e-government and the whole concept of electronic government is new to the ministries, to the people and to industry. Information Technology itself is new to many citizens, government and industry users, and the technical infrastructure and technology standards needed to support e-government services have not yet been developed. Some first projects may be being attempted by individual ministries, but these are probably not yet recognised as being e-government.

At the Recognising stage, initial studies and promotion of the concept of e-government have resulted in widespread recognition of the potential for electronic government services and generated high management and user expectations. A strategy is under development and ambitious targets are being set. More extensive technical infrastructure is beginning to emerge.

At the Define stage, strategy is mature and accepted, and the necessary investment, standards and organisation have been established. It is likely that pilot projects are well advanced and that the education level of the people and the maturity of the infrastructure are sufficiently advanced to encourage the use of simple e-government services by a growing number of citizens. Early adopters of e-government services may be beginning to stretch the limits of the technology and place increasing demands on information and service providers. At this stage, information departments within ministries will begin to focus on the core business of their ministries, rather than on eye-catching initiatives.

At the Manage stage more advanced technology and services are available to citizens, and these are well developed. The organisations responsible for the provision of services are more established and mature. At this stage we may expect to see "joined up" services from ministries, and the initial deployment of advanced technologies such as smart cards for citizens and perhaps interactive kiosks in public places.

The Optimising is the highest level. All aspects of People, Technology and Organisation are at the highest level of maturity and comprehensive electronic services are deployed, with increasing customer satisfaction and business benefits to the ministries. The focus will have switched to the enhancement and optimisation of electronic services that are increasingly efficient, reliable, secure and citizen-centric. At this stage we can expect to see sophisticated quality, financial and security management systems in place so that the services delivered by ministries can be continuously measured and improved.

In the next and final chapter, the findings of this model are compared with the findings of other investigations concerning e-government.

## APPENDIX 6.1 - INTERVIEWS AGENDA TO POPULATE THE MATURITY MODEL

Name: _____ Date: _____

Role: _____ Time: _____

Job title: _____

Qualification: _____

Organisation: _____

Experience: _____

Interview No: _____

*Questions 1-3 can be used to determine the Characteristics for People, Organisation and Technology in the Initial, Recognising, Define, Manage and Optimum stage of the Framework. A similar pattern was followed in turn for each of the three POT aspects.*

Q.1. What is the level of awareness of information technology, the potential of e-government and the potential level of access to electronic information services for the majority of citizens? **(People)**

Q.1.A. Define the Characteristic of the Initial Stage

Q.2.B. Define the Characteristic of the Recognising Stage

Q.3.C. Define the Characteristic of the Defined Stage

Q.4.D. Define the Characteristic of the Manage Stage

Q.5.E Define the Characteristic of the Optimising stage

Q.2. What are the levels of planning, development, co-ordination and delivery of e-government services? **(Organisational)**

Q.3. How well developed is the national telecommunications infrastructure, the availability of information technology to citizens and the use of electronic channels between the government and citizens? **(Technology)**

Q.4. What Task are suggested for maximising the effectiveness of the Initial stage, the Recognition Stage, the Define Stage, Manage Stage, and the Optimising Stage for People, Organisations and Technology?

Q.5. What are Measures could be used for progressing between each of the five stages for People, Organisations and Technology?

Any other comments .....

## APPENDIX 6.2 - FOUR RANDOMLY SELECTED FACTORS FROM DIFFERENT INTERVIEWS

**Example 1** - Identifying a Factor for the Characteristics for the Initial stage of the Technology aspect.

The following five quotes from the first question for identifying the above factor were grouped together to produce a Factor called "***Absence of any multi-channel strategy***"

Interviewee 3: "*At this stage, no strategy for available for different technologies for contacting the government*".

Interviewee 5: "*At this stage, different electron services not available*".

Interviewee 10: *"At this stage, technology infrastructure for different use not available"*.

Interviewee 15: *"At this stage, I think infrastructure not existed"*.

Interviewee 18: "At *this stage, face-to-face is only channel to contact the government for majority of the citizen*".

This factor was then described as follow:

| Indicated Stage | Factor of the Stage Characteristic | Description |
|---|---|---|
| The Initial Stage Technology/Characteristic | Absence of any multi-channel strategy | Strategy to provide different electronic access are not available |

**Example 2** - Identifying a Factor for the Task for the Manages Stage of the Organisation aspect

The following six quotes from the first question for identifying the above factor were grouped together to produce a Factor called ***"Business Process Re-engineering"***

Interviewee 2: *"At this stage, processes need to be reviewed".*

Interviewee 5: *"At this stage, we need to get out from rigid system and re-engineer the process".*

Interviewee 10: *"At this stage, we should review our process in our Ministries".*

Interviewee 19: *"At this stage, streamline the process".*

Interviewee 13: *"At this stage, we should re-engineer our process".*

Interview 23: *"At this stage, process in the Ministries must be reviewed".*

Factor is then described as follows:

| Indicated Stage | Factor of the Task | Description |
|---|---|---|
| Manage Stage – Organisation/Task | Business process re-engineering | Restructuring the existing information systems and business processes of ministries to achieve breakthrough improvements in efficiency and effectiveness. |

**Example 3** – Identifying a Factor for the Measure for the Defined stage the of the Organisation aspect for progressing.

The following six quotes from the first question for identifying the above factor were grouped together to produce Factor called ***"Good project management"***

Interviewee 8: *"To move to next stage, good project management must be in place".*

Interviewee 6: *"To move to next stage, we need to manage our project correctly".*

Interviewee 11: *"To move to next stage, Project must be run and manage correctly".*

Interviewee 21: *"To move to next stage, successful project management to be applied".*

Interviewee 18: *"To move to next stage, Project must be professional managed".*

Interviewee 7: *"To move to next stage, we need to apply a proper project management method".*

Factor is then described as follow:

| Indicated Stage | Factor of the Completion Measure | Description |
|---|---|---|
| The Define Stage<br><br>Organisation/Measure | Good Project management | Good project management skills to be able to run complex project for e-government |

**Example 4** - Identifying a Factor for the Measure for the Defined Stage the of the People aspect.

The following six quotes from the first question for identifying the above factor were grouped together to produce an factor called ***"Identification of pilots"***

Interviewee 3: *"To move to the next stage, we need to begin with a small project first".*

Interviewee 5: *"To move to next stage, I suggest that, pilot projects must be identified to avoid mistakes".*

Interviewee 11: *"To move to next stage, in my view, we should have quick- win projects first".*

Interviewee 18: *"To move to second stage, we start with small project before large ones".*

Interviewee 9: *"To move to next stage, we should identify pilot projects".*

Interviewee 21: *"To move to next stage, to avoid failures small project should start first as pilots".*

This factor will be then described as follow:

| Indicated Stage | Factor of the Completion Measure | Description |
|---|---|---|
| The Recognising stage People/Define | Identification of pilots | Identifying of suitable pilot application with high probability of success |

# CHAPTER 7

# SUMMARY, APPLICATIONS AND DISCUSSION

The original objectives of the research, as stated in Chapter 1, were to:

1. Discuss the efforts of the Government in Oman to merge IT and Telecommunication departments.
2. Describe the status of IT in Oman prior to any e-government initiatives in Oman.
3. Evaluate the problems encountered by the Sultanate of Oman during the Y2K experience, to indicate the scope of national abilities at the time.
4. Review the implications of e-Government and maturity frameworks, as they are related to IT management.
5. Capitalise on the preceding work by developing a generic Maturity Framework for e-government.

It will be seen that all these objectives were met.

A summary of the research is now presented, followed by discussion of the findings and a description of how they have been applied. The model is compared with previous models to highlight its advantages and justify the research contribution of this thesis.

## 7.1 SUMMARY

The research started with an examination of the merging of the computer and telecommunications departments in an Omani government ministry. It was found that a number of management aspects had been ignored when the merger was undertaken.

The outcome of a series of workshops for managers involved in IT in Oman was that a number of issues would need to be investigated before starting to implement e-government on a large scale, and there was seen to be a need to develop a systematic roadmap.

The first important national scale IT project in Oman was set up to deal with the potential crisis of Y2K. The management of this project was evaluated, and lessons were learned which would be applicable to future projects.

Ways of measuring the progress of countries regarding e-government, and a number of basic management models for e-government, were found by researching the literature. These models covered fewer management aspects than had been found in the research on mergers. One important model was the Carnegie Mellon Maturity Framework, which had been applied with some success for managing IT in Royal Dutch/Shell and the UK Post Office.

A maturity framework for e-government was then developed, incorporating the best ideas from the literature, and adding new ideas from the research carried out so far. Detail was added to the new framework, called the POTIRDMO Framework, by research involving a large number of IT stakeholders in Oman.

## 7.2 APPLICATION OF THE FINDINGS IN OMAN

The progress of this research matched well with the progress of IT in Oman, and so the research was able to be influential in providing timely advice to government.

Firstly ten aspects of management that should be considered when undertaking a

merger of departments to form an ICT department were identified. Mergers had been carried out independently in different ministries, and as a result of this research, and its presentation in a workshop, it became a government concern to ensure that lessons learned about mergers in one ministry would be applied in others. The researcher was consulted by the managers responsible for IT in three ministries and mergers then took place in these ministries much more successfully.

A trend developing at the time the merger work was completed was for IT to move from performing ancillary functions such payroll and accounting, to performing the core functions of organisations. Another trend was for ICT to become for the first time a concern at government level. Because of these trends the three workshops proved to be very timely. It was evident from the research that the implementation of e-government was important for Oman, and the workshops found agreement on this. A strongly emphasised outcome of the workshops was that the implementation of e-government should be in stages, aimed at appropriate targets. The same idea was found later on in the Carnegie Mellon five stages framework, and so it was very appropriate to adapt that framework.

It was also agreed that some sort of roadmap would be useful to help in planning for e-government in Oman. This meant that there was a readiness to accept a framework when it was found, and a firm commitment to support its development by research.

The workshops uncovered the need to be able to share data between ministries. This was a national level project which needed to be completed successfully as an essential step towards e-government. All the participants were convinced that data sharing would greatly increased work efficiency and improve overall security. This time the need was seen to research the project before undertaking it, unlike in the case of the earlier mergers of ICT departments. The study of data sharing led to recommendations which were put into practice, and now some ministries are successfully exchanging data in their operations.

There arose the understanding that e-government should be an ongoing loop between the government creating the vision and the private sector implementing it, leading to a

healthier relationship between the two parties, to the benefit or the country.

The workshops identified that all participants had difficulty in the recruitment of skilled and experienced IT personnel. This problem was notified to the Government, and now substantial IT training is taking place, and the number of qualified people is starting to rise.

There was agreed to be a lack of advice on overall strategy and direction. In the absence of a government-wide strategy, a number of ministries and agencies had, often without co-ordination, started to define their own standards. There is now a strategy in place, as will be described in section 7.3.5, and a national forum for IT cooperation.

### 7.2.1 Progress of Oman's IT management

The merger projects could be considered almost complete failures, and the research uncovered other examples of a high failure rate in IT projects, for example with the GIS project and the GITC project. The research uncovered the aspects of management that had been neglected, enabling improved management to take place. By the time of the first national scale project, the Y2K project, most aspects of management had been thought of, and the research was able to examine how well they were dealt with rather than whether they were dealt with at all. The Y2K project was certainly a success, and indicated that Oman was now managing its IT at an acceptable level by world standards. The application of all the lessons of the research into the POTIRDMO model offered the prospect of being able to move to a still higher standard. As will be seen in Section 7.8, at the end of this Chapter, Oman moved to a leading position on at least one project.

## 7.3 ADVANTAGES OF THE POTIRDMO MODEL

### 7.3.1 Comprehensiveness

In developing the POTIRDMO Maturity Framework, the spirit of the findings from the Merging, Y2K and Data Sharing projects was followed, and the attempt was made to create a comprehensive model, in which all aspects of management in the different stages had been identified. Comprehensiveness was achieved by identifying in each stage the Characteristics, Tasks and Measures, and distributing the factors identified for each to aspects of People, Organisation and Technology. The POT and CTM aspects are mostly ignored in the models discussed previously.

In most published e-government models the maturity concept too had not been given much attention. Most of the models concentrate on readiness to start on e-government, but had little to say about stages of implementation. Some models that had more detail on stages tended to consider technical delivery only, and ignored many management issues.

This means that the framework is more comprehensive than the Royal/Shell and Post Office frameworks on which it was built.

Detailed comparison is made in section 7.4 below between the model and some other government models.

### 7.3.2 Research based

There is no evidence that any of the other models found is based on more than experience or opinion. The POTIRDMO model is formed by systematic research involving a large number of projects and players.

### 7.3.3 Tested in use

As explained above, and also below, the model has been applied within Oman.

### 7.3.4 Benchmarking capability

The POTIRDMO model includes within it the benchmarking function which was the

topic of some earlier models. By looking only at the Characteristics factors in the Technology aspect, we get the equivalent of some of the simple benchmarking models.

As an example of benchmarking, the POTIRDMO framework of Figure 6.13 will now be used to describe the position of e-government in Oman at the start of this research (1996), and at the end (2003).

The following factors from the Initial Stage applied at the start:

- Low level of IT education and skills
- No strategy
- No multi-channel strategy
- Little use of electronic channels

The following factors apply at the end, in different stages:

Stage 1: Initial Stage

- High-level political support

Stage 2: Recognition Stage

- Campaigns to raise awareness
- Project team formed
- New technologies studied
- Teamwork across boundaries
- Introducing electronic channels
- Identification of pilots

Stage 3: Define Stage

- Central unit in place
- Citizen education programme initiated

- Citizen smart card strategy defined

Stage 4: Manage Stage

- Smart cards in use to access services

### 7.3.5 Road mapping capability

Because the model has five stages, and the future stages have been populated with predictions, it provides an intrinsic road mapping function. It enables you to see where you are now, what should be done now, where you are immediately heading for, and what the route beyond that will be like.

One of the characteristics of the Initial stage defined by the POTIRDMO framework was the absence of a national strategy for e-government. As a result of this research the Government of Oman commissioned the Gartner consultancy company to develop an e-government strategy for Oman. The findings of the Gartner report were then available to compare against the findings of the POTIRDMO framework on the same problem. This is discussed in the next section.

#### *7.3.5.1 Comparison of road mapping of POTIRDMO with a consultants strategic recommendations*

In June 2002 the Ministry of National Economy issued a tender call for "the provision of consultancy services for developing an e-government strategy", and the work was awarded to the Gartner Consultancy.

Gartner employed 12 people, with head office support, and spent 6 months on the project. The organisation of the project was based around a project team from both the Oman Government and Gartner. The Government team, the IT Task Force, was headed by Mr. Said Ismaily, while the Gartner team was headed by Dr. Tony Murphy. The researcher was an active member of the ITTF team and he worked very closely with the Gartner team.

Great care was taken to ensure that stakeholders were identified and involved. The list of eleven types of stakeholder were identified by the researcher were presented to

assist in this process. The list was classified by Gartner into the following groups: Government Organisation, Education Sectors, Omantel[1], Business and Public.

The target date for the delivery of the draft strategy report was the end of December 2002. With the active participation of all parties, this ambitious target was met, and the strategy was formally presented to the Ministerial Council. The Ministers fully accepted the draft recommendations, and requested that these be fleshed out into fully specified and costed proposals. The final report was produced in March 2003.

Gartner's approach was to apply the experience they had gained in a large number of consultancies. Their methodology has not been published, but it is known that they use a four stage model, as described in section 5.3.2. Their report[2] was a large document, making detailed recommendations in each of the areas listed in the left hand column of Table 7.1, below.

Out of interest, it was decided to compare the areas for action recommended by Gartner against the components of the POTDIRMO framework, as shown in table 7.1.

[1] Omantel stands for Oman Telecommunication Company, previously known as GTO.

[2] Private publication.

**Table 7.1** Comparison of Gartner recommendations on e-strategy for Oman with POTIRDMO model recommendations

| Gartner recommendations | POTIRDMO model |
|---|---|
| • E-Government Architecture<br>• Supporting IT infrastructure | **Stage2**/Technology/Measure<br>• Investment in new Infrastructure<br>• Planning and forecasting skills |
| • Applications and Communities of Interest | **Stage 2**/Organisation/Tasks<br>• Teams across boundaries. |
| • Service Delivery Model<br>• Flagship 'Quick Win' projects | **Stage 2**/People/Measure<br>• Identification of pilot. |
| • Security, PKI, Audit<br>• Continuity Planning | **Stage5**/Technology/characteristic<br>• Advanced security features<br>• Implementing of information security |
| • Implementation Structures | **Stage3**/Organisation/Characteristic<br>• Central unit in place |
| • Information Society initiative | **Stage 2**/People/Characteristic<br>• Citizen surveys initiated |
| • Environment (developing ICT skills) | **Stage 2**/ People/Task<br>• IT education |

This shows that most of the Gartner recommendations were to be found in the POTIRDMO Framework at stages 2 and 3, but that the order does not follow the same logic. This result can be compared with the benchmarking result of section 7.3.4, which also located Oman's e-government as being in stages 2 and 3. However, the appearance of a Stage 5 recommendation in the Gartner report was surprising, and therefore questions were be asked about this particular recommendation.

### 7.3.6 Participant involvement

A final point to make in this section about the advantages of POTIRDMO is that a research-based process has a wider benefit than just the production of its findings. Each interview made in populating the model meant that another person became informed about the project and had their attention turned to the importance of management in IT. Thus the research formed a part of the process of managing e-government, and promoted communication among the stakeholders.

## 7.4 COMPARISON OF OTHER COUNTRIES' INITIATIVES AGAINST THE POTIRDMO MODEL

A number of governments around the world have been participating in e-government initiatives and have undertaken collaborative approaches at the national level to co-ordinate both public and private sectors organisations.

Three initiatives from the United Kingdom have been selected to compare with the outcome of the POTIRDMO maturity framework model. The comparison is based on the strengths and weakness of these initiatives in reference to the POTIRDMO model, and how applicable these initiatives would be to Oman.

The information about the initiatives is based on a report published by the Central Information Technology Unit (CITU) available at www.e-envoy.gov.uk. Included in this is a review of other e-government models such as "Benchmarking Electronic Service Delivery", published by the UK Central IT Unit, July 2000, and the UK's "Modernising government white paper".

The United Kingdom has appointed a Government e-Minister, and an e-Envoy, to lead work on the information age agenda across Government, "their mandates are to establish a new network of information age Ministers from key departments and set up a transparent system of accountability, with monthly progress reports to the Prime Minister" (CITU report).

The detailed recommendations following from this approach by the UK show clear

parallels with the outputs on a similar situation by this research carried out in Oman. The POTIRDMO model suggests that in the Initial stage in Oman there should exist a motivated champion to promote e-government initiatives, and a strong advisory body to run e-government and gain support from the cabinet, Ministries and Other Government Organisations.

### 7.4.1 The UK's GovTalk web portal

According to the UK's CITU, the adoption of e-government technology to provide a single point of access for service delivery to citizens and the private sector was seen to be a very important issue in the United Kingdom. In 2002 the UK government introduced a web entity called GovtTalk "It is an open initiative in which governments and industry work together to integrate and simplify the adoption of e-government technologies".

GovtTalk is basically a Government Portal[3] where the Government should be able to appear on the Web as an integrated organisation, with the "aim to provide citizens with easy-to-use and personalised services, transactions, information. It allows citizens to interact with government 24 hours a day, 7 days a week, and enables them to influence political discussions and processes within their city, region and country".

According to the POTIRDMO model the GovtTalk Portal should address three categories of relations: Government, People and Technology. These issues are not addressed thoroughly in GovtTalk, which is mostly concerned with how the technology will provide services to the people, but does not address specific people issues. The UK appears to take for granted that education on Information Technology, encouraging people to become part of the national and global information society, and educating them in the benefits of the information age and how it will impact on day-to-day business, are all in place.

[3] GovTalk defines a Portal as "an application or device that provides a personalized or adaptive interface for people to discover, track and interact with other people, organisations and content."

People want Government to provide services which are accessible, convenient and secure. Although the security issues have been addressed in the GovTalk model, the POTIRDMO model suggests that the Government must also build integrity and reliability of e-government transactions to get the trust of the people.

People should not have to understand the internal structures of government to find the information or service they need. This is addressed in both models.

Implementation of the GovtTak Portal has taken for granted the availability of high bandwidth communication in the United Kingdom. This might be valid in the United Kingdom, but it would be impractical to apply it Oman. This research in (Chapters 3 and 4) highlighted the infrastructure concern in Oman, such as the shortage of physical telecommunications networks and connectivity, quality of lines to ensure stable connections and sufficient numbers of ports to support a high volume of concurrent users.

The POTIRDMO model however, addresses these issues very well. The model suggested that there should be more extensive studies of technical infrastructure and that analysis should be made of what is available now and what technologies can be anticipated in the near future. Once this action is complete, then rolling out of the new telecommunications infrastructure, such a high bandwidth network, must take place.

According to CITU, the GovtTalk site was split into two projects: one to design and build the site, the other to integrate the systems of all departments to create the single gateway to government that is the point of the portal. To achieve the second project, working groups across government organisations were established.

The POTIRDMO model too, stresses the importance of establishing co-operation and team work across organisational boundaries, especially across Government organisations. The model stresses the importance of restructuring existing information systems and business processes. It is important to note that while Information Technology expenditure has increased in recent years in Oman, the processes and structures within government have not developed as well. Previous chapters in this research reported that business processes within government remain paperbound and

bureaucratic, and lack integration between Ministries. The POTIRDMO model suggests that before new applications are introduced, underlying processes must be redesigned to achieve effective e-government.

### 7.4.2 The UK's Office of Government Commerce approach to managing government projects

The second relevant initiative by the United Kingdom Government is the recent establishment of The Office of Government Commerce (OGC) as an independent Office of the Treasury reporting to the Chief Secretary. According to an OGC report published on www.ogc.gov.uk, the "OGC is responsible for a wide-ranging programme which focuses on improving the efficiency and effectiveness of central civil Government procurement. In addition, OGC has an important role in developing and promoting private sector involvement across the public sector". OGC is concerned with all government projects, not with e-government in particular. OGC has developed generic recommendations for application to all new government commerce projects.

According to OGC, a project should be conducted in phases: "A phased approach has been adopted that is appropriate to the project and based wherever possible on evidence of similar projects that have succeeded". This approach clearly supports the important element of the POTIRDMO model for e-government, which is a five phase approach.

Another important factor emphasised by the OGC project, is the importance of project management skills. The POTIRDMO model also suggests that good project management skills are required to be able to run complex projects for e-government.

OGC suggests that "innovative components of an e-government service should be trialled with a pilot group of customers; each component of the service could be developed to full functionality but delivered one at a time; or all the components could be delivered together with limited functionality at first and refined further over time". The POTIRDMO model clearly emphasises the importance of identification of

suitable pilot applications with a high probability of success.

OGC produced an assessment model called Project Management Maturity Model (PMMM). OGC state that the PMMM is based on the process maturity framework that evolved from the Carnegie Mellon Software Engineering Institute's Capability Maturity Model.

The PMMM directly adopted Carnegie Mellon's five level maturity framework, with the same stages: Initial, Repeatable, Define, Manage and Optimised. The PMMM describes the project-related activities within key process areas that contribute to achieving a successful project outcome. Twenty one key process areas were identified and placed into appropriate maturity levels. For example a key process area such as "project definition" is in the Initial stage of the PMMM, while a key process "continuous process improvement" is in the Optimised stage of the PMMM. OGC suggested that the levels allow organisational transition from an immature state to a mature and capable state, with an objective basis for judging project quality and solving project issues.

The POTIRDMO model adopted similar concepts from the Carnegie Mellon Software Engineering Institute's Capability Maturity Model, but modified them for the case in hand. Notable differences are that the POTIRDMO model is country specific, e-government specific, and has a three dimensional approach (People, Organisation and Technology). Also the activities in the PMMM are equivalent only to the Tasks in POTIRDMO; PMMM has no Characteristics or Measures.

### 7.4.3 The UK's benchmarking of electronic service delivery

The third relevant initiative by the UK Government is the Benchmarking Electronic Service Delivery project published by the Central IT Unit in July 2000. This study was conducted on behalf of the CITU by the Central Computer and Telecommunication Agency (CCTA), part of UK's Office of Government Commerce.

The purpose of this study was to compare the UK Government's progress against that of the G7 countries and others. The project found that many countries had an

ambitious plan to implement e-government, and most of them were in the implementation stage of e-government. None of them had reached a complete electronic service delivery.

Some countries had set target dates for implementing e-government. For example Austria targeted all appropriate federal government services capable of being delivered electronically via the net by 2001. In Germany all administrative targets that lent themselves to electronic service delivery were to be made available by 2005. China intended to enable 80% of the administrative services of municipal government agencies to be delivered via the internet by 2005. Hong Kong had ambitions to have 90% of services amenable to electronic service delivery to be online by the end of 2003. Canada hoped to achieve all key government services fully on-line by 2004. The United Kingdom targeted "100% of government services carried out electronically by 2005". The United States intended to: "Provide public access to government services and documents by 2003 and to provide public with an option to submit forms electronically". There is no evidence that any of these targets have been achieved.

This international benchmarking study identified a number of key lessons about the implementation of e-government. The POTIRDMO model also identified related lessons and actions to be taken, as reported in the Table 7.2, below. The statements in each row of the table are not always exactly equivalent. This is partly because one column contained findings and the other contains recommendations, and partly because the POTIRDMO model applies to the case of a specific country.

**Table 7.2** Comparison of lessons from the UK's benchmarking study and PORITDMO model recommendations.

| Lesson No | Lessons identified by Benchmarking study | Recommendation from the POTIRDMO model. |
|---|---|---|
| 1 | Electronic service delivery raises expectations and technology needs to be fast and robust. | Multi-channel strategy to be established and new electronic infrastructure, such as high bandwidth rolled out. |
| 2 | Successful applications depend upon reliable back office. | Central interim registration authority to manage the electronic identification of citizens and the management of access rights to e-government services. |
| 3 | On-line service means you have to re-engineer your business. | Restructuring the existing information systems and business process of ministries to achieve breakthrough improvements of efficiency and effectiveness. |
| 4 | A choice of electronic service delivery, but counter service should be preserved to ensure social inclusion. | Demonstrating the security, integrity and reliability of e-government transactions to get trust of the citizen and also to encourage people to become part of the national and global information society. Educating citizen about the benefits of the information age and how it will impact on day-to-day business. |

| | | |
|---|---|---|
| 5 | Electronic services must be, and must be seen to be, suitably secure. | Technology infrastructure provides high quality of service with trusted high security maintained at optimum stage. |
| 6 | Pilots first to avoid mistakes. | Governments initiate pilot projects to capture lessons in early stages. |
| 7 | Sell your service to capture citizen trust. | Launching campaign to raise awareness of Information Technology and e-government matters among the citizens. |
| 8 | Provide incentives to ensure a critical mass of take up. | Identifying benefits of implementing e-government and Multi-purpose smart card in place, which citizen use to access Government services. |
| 9 | Build upon the success of others and adopt good practices that have been successful elsewhere. | The business case for implementing e-government should be developed, costed and understood. |
| 10 | An e-government Champion is essential. | Having in existence a motivated champion to promote e-government. |
| 11 | Education is a key issue. | Education programme to enhance the citizen's knowledge and usage of Information Technology and e-government services is initiated. |

It can be seen from this table that each finding of the international benchmarking

exercise has an equivalent recommendation in the POTIRDMO. The benchmarking exercise found all the actions found in POTIRDMO at the stages relevant to the time when the survey was done. However the POTIRDMO model also contains actions for earlier stages and stages still to come.

It can be seen that the POTIRDMO model is far more comprehensive in its approach. It provides a roadmap, a consideration of all management aspects, and a benchmarking tool. It considers the points of view of all players, citizens, IT providers, managers and decision makers.

The POTIRDMO model is however very specific. As it stands it only applies to Oman. To apply it elsewhere, the population of its cells would have to be re-done, using a research approach.

## 7.5 RESEARCH CONTRIBUTION

The model developed is more comprehensive than previous models, it has the advantage of being research based, it has been applied in practice, and its performance has been compared with that of other models, with a favourable outcome. Ways to apply it to new situations are built into the methodology of its formation.

## 7.6 LIMITATIONS OF THE RESEARCH

The scope of the research was country specific. This framework should not be applied to another country without conducting research to identify the details of the Factors that apply to that country.

The Factors placed into the higher stages of the framework are necessarily somewhat speculative, because no one has actual experience of working in these higher stages. The early Factors are based on experience, but the later Factors incorporate judgment and prediction. As implementation advances up the framework, the higher level factors should be reviewed by research.

No attempt has been made to quantify the impact of applying the Framework, either concerning its benefits or its costs.

## 7.7 FURTHER RESEARCH

Based on the above findings and recommendations, it is clear that at least the following aspects need to be further researched:

(1) Only the merging of computing and telecommunication departments was studied. Merging of IT-dependent functions such as library, information security, central archives, and data management are also possible and perhaps beneficial, to form information service departments. A similar approach could be followed for research into these further mergers.

(2) Application of the POTIRDMO framework to more concrete case studies in different e-government initiatives.

(3) The application of POTIRDMO model should be monitored to identify risks and problems.

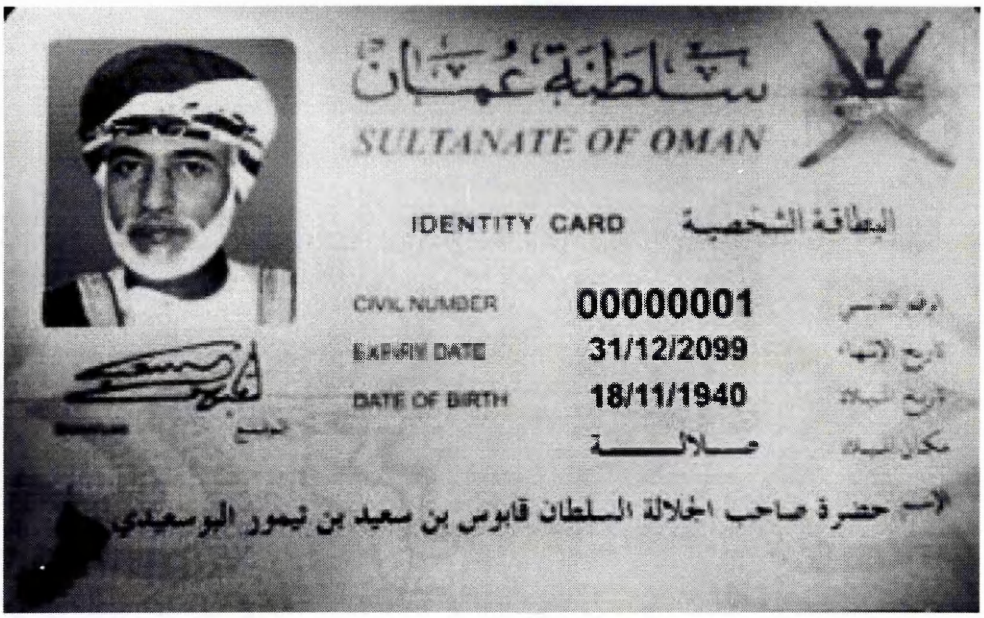
## 7.8 A LAUNCHED E-GOVERNMENT PROJECT

The data sharing project and the national IT strategy were really preparation for e-government; they did not in themselves affect the citizens. One project that does affect citizens, and whose planning was assisted by use of the Framework has just been launched. This was the National Registration System project.

A Royal Decree dated 4th October 1999 required The Royal Oman Police to establish a new Directorate General of Civil Status to implement a National Registration System using smart cards. The purpose was to record civil incidents for all Omani Citizens above the age of fifteen years, and expatriate residents. The civil events to be recorded include:

- registration of Births
- registration of Deaths
- registration of Marriage
- registration of Divorce
- registration and Changes to Residency or Citizenship
- the printing of Certificates to record the above Civil events
- the registration and printing of the Smart ID Cards

Card number one was issued to his Majesty Sultan Qaboos, on 4th January 2004.




This achievement puts Oman up with the leading nations in implementing e-government projects, and as far as identity cards are concerned, several years ahead of the UK.